Established 1916 as The OIL WEEKLY®

VOLUME 148, NO. 6 MAY, 1959

WORLD OIL

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SPECIALIZED FOR EXPLORATION, DRILLING AND PRODUCING OPERATIONS AND MANAGEMENT

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WORLD OIL published every month except semi-monthly in February and August. Second class postage paid at Houston, Texas

a Quick Look at this issue . . .

BUSY OIL MEN: To help you put first things first, scan these time-saving digests on this and the following pages, checking ☑ those you want to read first

☐ **Strong demand makes oil outlook favorable** . . . The oil industry situation currently is made healthy and promising by the prevailing strong demand for petroleum products. Total demand for petroleum in the first quarter of 1959 was about 6.8 percent above last year. An increase of only 3.7 percent was forecast at the beginning of this year. Demand has been substantially larger than expected for gasoline and residual fuel oil. Distillate demand has only slightly exceeded expectations. U.S. markets for crude oil and refined products are generally firm, with benefit of relatively low inventories, curtailed imports, and reasonable producing rates. **Page 25**

☐ **New DST technique yields better formation samples** . . . A nitrogen blanket is being used instead of the usual water cushion in drill stem testing operations. Used with conventional testing tools, the nitrogen testing procedure provides operators with better formation data since recovered fluids are not diluted or contaminated with cushion water. Other features: increased safety, reduced rig time requirements, and precise control. For a complete discussion of the nitrogen technique and other varied oil field uses of this inert gas, see . . . . . **Page 155**

☐ **Rubber sleeve core barrel increases recovery** . . . A need for reliable reservoir information in many areas has led to the development of a rubber sleeve core barrel. Operation of this new tool and field results are discussed in an article beginning on. . **Page 155**

☐ **How to improve your gas lift installations** . . . Down-hole pressure and temperature surveys can provide valuable information to operators concerned with gas lift wells. Improved installation efficiency, reduced injection gas volumes and lower initial equipment investment can result if pressure- temperature data are available. For the latest information on how to apply such data to your well, turn to. . . . . **Page 162**

☐ **Gilsonite reduces lost circulation when cementing** . . . A greater demand for a low-density cementing slurry possessing lost circulation control characteristics is becoming more evident. Gilsonite, a solid hydrocarbon, is presently being used successfully. This article discusses the various physical properties of this material, laboratory test and results while using this additive in cement slurries, and the results of field operations . . . . . **Page 167**

☐ **How new additives improve deep well cementing** . . . Phillips Petroleum Company drilled three deep tests in Pecos County, Texas, during 1958. Several new records were established and technological advances recorded while drilling these wells. Cementing practices were unique because of great depths and high temperatures. A complete discussion of cementing practices on these wells begins on. . . . . **Page 171**

☐ **Seismic velocity effects may hide organic reefs (Part 2)** . . . Data are provided here for estimating the amount of false structure that little known reefs can be expected to produce. Estimates can be compared with actual seismic results for interpretation purposes or used to interpret the actual attitude of reflectors masked by velocity effects in overlying beds. . . . **Page 178**

☐ **Plastics reduce sand problems along Gulf Coast** . . . Recent developments in the application of sand consolidation plastics are proving beneficial in controlling incompetent sand formations. This technique has proven valuable in the Gulf Coast area. Multiple completion of offshore wells has been facilitated by the use of plastic to control loose sands. Sand consolidation jobs using plastic have proved successful in approximately 85 percent of the treatments performed. Application of this method as well as factors believed responsible for unsucessful jobs are discussed in the article on. . . . . **Page 183**

☐ **New techniques opening up new areas to air and gas drilling** . . . Heretofore, when certain quantities of water were encountered, air or gas drilling

Want to save money, time and effort?

. . . . Then be sure to read these outstanding technical features to be published in June WORLD OIL:

- **Use of volcanic ash to improve oil field cementing practices** will show you how pozzolanic additives in portland cement cut costs, reduce fluid losses and improve perforating characteristics.
- **Ways to increase penetration in hard formations and maintain original hole size in softer formations** are presented in this detailed discussion of general configuration of holes drilled as a result of drill string hookup hole relationships, rate of penetration, stabilization program and drilling practices.
- **How to minimize tubing failures caused by sand abrasion** will present information of top interest to producers of multiple completed oil and gas wells. Relationship of number of perforations, sand velocities, producing rates, abrasion rates, and associated factors will be discussed to help solve the serious problem of "cut" tubing which occurs opposite upper producing zones of multiple wells.
- **Report on a new casing patch procedure** which materially reduces the time required to pull and replace bad-order strings of pipe.

operations had to cease. But new methods are being used to overcome these difficulties. For a discussion of these advancements in air and gas drilling, turn to..Page 188

☐ **Drill stem logging tool is successful** . . . A new electric logging tool has been developed which permits logging of freshly drilled formations without removing drill pipe from the hole. The device is pumped down the drill pipe and an electrode assembly projects out through a mud passage in a jet bit. Logs are recorded when coming out of the hole or the instrument can be recovered by wire line.....Page 191

☐ **How to evaluate reservoir performance** . . . Indexes of drive developed in this article can be applied to practical reservoir performance evaluations. Previous driving indexes considering both produced reservoir oil and produced reservoir gas were little value in actual reservoir studies. This new approach increases the utility of indexes of drive by considering only produced reservoir oil. It's another in the popular series *For Your Production File*.....Page 193

☐ **Smaller Operators Drill 77.5 Percent of U.S. Wells in 1958.** Independents continue to drill over three out of four wells completed in the United States. They accounted for 37,456 wells or 77.5 percent of the total of 48,331 wells completed in the country in 1958. That was a higher proportion than the 76.4 percent of 1957 or the 76.7 percent of 1956. Forty-two larger companies in 1958 drilled 10,875 wells, or 22.5 percent of the U.S. total. Their proportion was less than 23.6 percent in 1957 or 23.3 percent in 1956.....Page 197

☐ **Strong evidence that western Switzerland** ultimately may become "oil country" is the abundance of surface shows of oil, gas and asphalt. They offer promise of petroleum production. The showings have been found mostly in the Molasse Basin and the Jura Mounatins. So far, there has been vary little drilling in the country, but interest in the oil and gas possibilities is increasing.....Page 198

☐ **The trend toward mechanized engineering and production records** is increasing in oil company operations. Reason: Considerable savings can result where there is enough data and records to justify their use. For a detailed discussion of the most practical methods to use in handling mechanized records, turn to Page 194

☐ **Two oil fields in Nigeria,** west central Africa, are being produced on a testing basis, to determine if they can be expected to be commercially profitable. Together, they have been yielding about 6,000 barrels daily. The oil is being shipped to Europe. Development of a third Nigerian field is in an early stage. In addition, three new oil discoveries were made in Nigeria last fall. They will require further development to determine their significance. Shell-B.P. Petroleum Development Company of Nigeria, Ltd., is carrying out this Nigerian development. It plans to continue energetic exploration. Page 200

Tulsa prepares for . . .

The biggest oil show on earth

- **1,497 exhibitors will display $500 million worth of equipment to be shown in . . .**
- **1,000 building booths and 26 acres of outside exhibits that cost more than . . .**
- **$10 million to present to 30,000 oil men from 50 countries and every oil producing state in the United States**

NEW AND IMPROVED EQUIPMENT for every phase of the oil industry—Hall of Science where the public can become better acquainted with the oil industry and oil men can view their latest scientific accomplishments—historical review of oil industry progress.

Oil field truck safety "Roadeo"—special awards to six "Grand Old Men", one from each oil industry division, plus selection of one man to be the oil industry's "Pioneer of Pioneers"—Tulsa Desk and Derrick Club selection of the industry's "Outstanding Woman."

These are just a few of the many attractions awaiting the 30,000 oil men and 500,000 non-industry visitors who are expected to attend the 14th International Petroleum Exposition in Tulsa, May 14-23.

Of top interest will be the half million dollars worth of oil industry equipment to be displayed by 1,497 exhibitors in 1,000 building booths and 26 acres of outside exhibit space. The displays will run the gamut of the oil industry divisions, representing production, drilling, transportation, refining, natural gas, and allied oil industry firms.

On hand to show and explain the equipment and services will be 6,000 exhibitor personnel. Most of the equipment will be displayed in the 58 new exhibitors buildings and exhibits that have been built since the last exposition.

Panorama of new developments. Oil men interested in exploration, drilling and production will see a wide array of the newest equipment and tools on the market, including the latest in multiple completion equipment, new geophysical designs displayed by several companies, and several designs of offshore drilling rigs and their operating techniques.

A full scale turbodrill in operation will be one of the features of the drilling exhibits. Slim-hole techniques and

equipment as well as numerous drilling rigs with tools of every size and description will also be in operation.

Exhibits in the production field ranging from the latest advances in fuel process, working model of the in situ method of secondary recovery, LACT systems, waterflooding equipment, miscible displacement, tracer methods and plastic pipe will be among the myriad of displays at the show.

Housing available. Exposition officials report that housing facilities for all visitors will be available within 30 minutes after arrival. Adequate, comfortable accommodations for the full 10 days or on a day-to-day basis are available on arrival by contacting the Housing Bureau at 514 South Main, Telephone LUther 5-8118 or housing bureau booths at the Mayo Hotel, Tulsa Hotel, Municipal Airport, Union Depot and the Bus Station.

Advance arrangements may be made by letter or telegram to IPE Housing Bureau, attention S. J. (Steve) Raphel, bureau manager.

Nomads help. More than 1,500 delegates from 50 countries outside the U.S. will find the welcome mat laid before them in Tulsa. Members from all five Nomad chapters in the U.S. have pooled their resources to make the show the largest in history from the international aspect. In 1953, more than 750 overseas delegates attended the show.

Services for international visitors include: Interpreters, travel information, visits with Oklahoma Governor J. Howard Edmundson by appointment, trips to see equipment operating in the field, four limousines with drivers will be at the delegates' disposal, and the traditional NOMAD party.

Going to the Show?

. . . Then save yourself some time by turning to the Exposition Section starting on **Page 203,** and looking over the list of products to be exhibited. Pick out the equipment that interests you most, note its location on the exposition grounds, and see it first.

Ask WORLD OIL for a copy of its handy classified directory of equipment on display, which will enable you to see who is exhibiting any type of equipment in which you may be interested. The directory also contains a foldout map of the exposition grounds. You may obtain a copy in advance by writing WORLD OIL, or by visiting Gulf Publishing booths 149, 150, 181, 182 in the Oklahoma Building.

Come visit us anyway, we'd like to meet you.

Too Busy to Go?

. . . Then turn back to the Exposition Section, for we have brought the show to YOU.

In either case, use the handy postcards to obtain additional information on the equipment you are most interested in. Further details on the above helpful services are given on **Page 203.**

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SUBSCRIPTIONS

F. G. Spindle, Subscription Manager, P. O. Box 2608, Houston, Texas, U. S. A.

Single copies 50 cents (except special issues). Double prices for single copies more than one year old. Subscription price: domestic and foreign, $2 a year.

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Postmaster: Send notification (Form 3579) regarding undeliverable magazines to World Oil, Box 2608, Houston 1, Texas.

Specialized oil publications of THE GULF PUBLISHING COMPANY, 3301 Buffalo Drive, Houston 19, Texas; Box 2608, Houston 1, Texas. Cable Address: GULFPUBCO.

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PIPE LINE INDUSTRY and THE PIPE LINE CATALOG for the oil and gas pipe line industry.

Indexed by Industrial Arts Index and Engineering Index

Looking Ahead

Outlook Good for Oil and Gas . . . Improved demand and firming prices assure U.S. producers and refiners a good market in '58, investors were advised recently by Value Line Investment Survey.

International companies face problems of U.S. imports restrictions, higher foreign taxes, overproduction, and lower world crude prices. However, those companies largely control European and other marketing outlets abroad and can "play off" one foreign producing area against another. Hence, internationals still have substantial profit potentials.

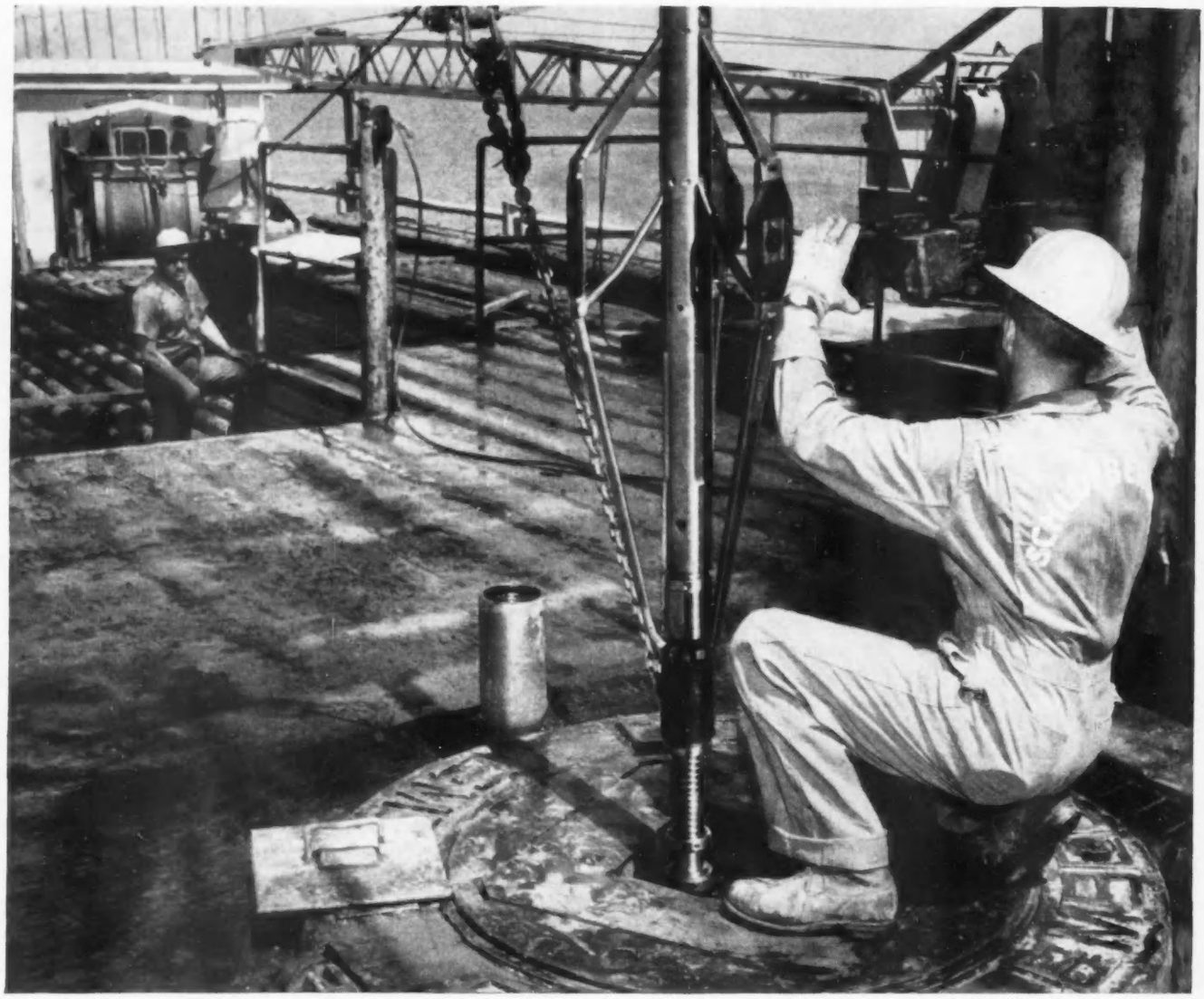
New Self-Contained Electrical Logging Device . . . Recent Sun Oil Company development promises electrical logs without making complete trip in the hole. They can be pumped down the hole, hung in the drill collar, and used to log freshly-drilled formations. The "wand" (electrode) drops through the bit and into open hole which is thus logged as the drill pipe is raised. If full trip or complete logging run is not required, the full string need not be pulled, and device can be recovered on a wire line. Advantages: Cuts drilling and logging costs, increases efficiency, reduces hazard of losing the hole while logging.

How to Make Hole for 25¢ Per Foot . . . After six years of field tests, Western Micro Corporation announces new portable drilling rig that reportedly reduces drilling cost to about 25 cents per foot and drills up to 150 feet per hour. Operators can drill 1,000 feet for as low as $75 and 2,000 feet for $400. Features of electrically powered unit:

- Has no rotary table or kelly; needs only a two man crew.
- Uses air or fluid as circulating agent.
- Mechanical-type impact sub built on spring-action principle imparts jarring motion to bit; bits are specially designed as conditions warrant.
- Rig has speed range of 90 to 120 rpm with three forward speeds.

Complete truck-mounted units are now available for shallow hole and exploratory work only. However, production is slated to start soon on rigs capable of drilling any depth hole.

Federal Noose Draws Tighter . . . New import controls will regulate 10 percent of U.S. petroleum needs, says National Petroleum Association President G. B. Hunter—the greatest power government has ever had over the oil industry in peace time. . . . **Though due for major arguments before FPC and possibly the courts,** FPC Examiner Joseph Zwerdling's April 6 Phillips recommendation that gas producer prices be based on average cost has aroused considerable anxiety in gas industry circles; some independents say such utility-type rate bases would penalize efficiency and result in widely varying prices for the same product . . . **When depletion battle will singe the floors of Congress is still uncertain;** Senator Proximire (D-Wis.) says he may wait until end of this session to start Senate debate on his depletion-cutting amendment. Representative Porter (D-Ore.) introduced bill to cut depletion to 15 percent on April 19 . . . **Meanwhile,** predictions are that committee decision on Treasury Department's request to eliminate percentage depletion on products will not be made this session, thus lessening chances for major Congressional hassle on depletion until 1960.



Logging a well with the Schlumberger Continuous Dipmeter. Non-magnetic "K" Monel alloy housing protects its reference compass as it registers subsurface formation slopes and changes.

How non-magnetic "K" Monel helps map mountains underground

One of the important "mapping" tools used to chart subsurface peaks and valleys and reduce dry holes is the Schlumberger Continuous Dipmeter. It measures and records dips and faults in formations, as well as the inclination of the hole, relying on a precision compass for a directional standard.

"K" Monel* age-hardenable nickel-copper alloy plays a key part in this dipmeter's operation . . . a housing of this non-magnetic alloy protects the delicate compass from shock and corrosion without affecting the compass reading.

Schlumberger engineers are well aware of the special properties of "K" Monel alloy. They've specified it for years in their Photoclinometer compass housing. Specified it, too, at many other critical points in Schlumberger instruments where corrosion, heat, pressure, shock, magnetism, or a combination, rule out common materials.

Your own producing costs may well be lowered by "K" Monel alloy in parts subject to corrosion, stress, or magnetic conditions. Get more information . . . write Inco for "Metals to Make Petroleum Production Equipment Produce More." For help in well logging problems, contact Schlumberger Well Surveying Corporation, Houston, Texas.

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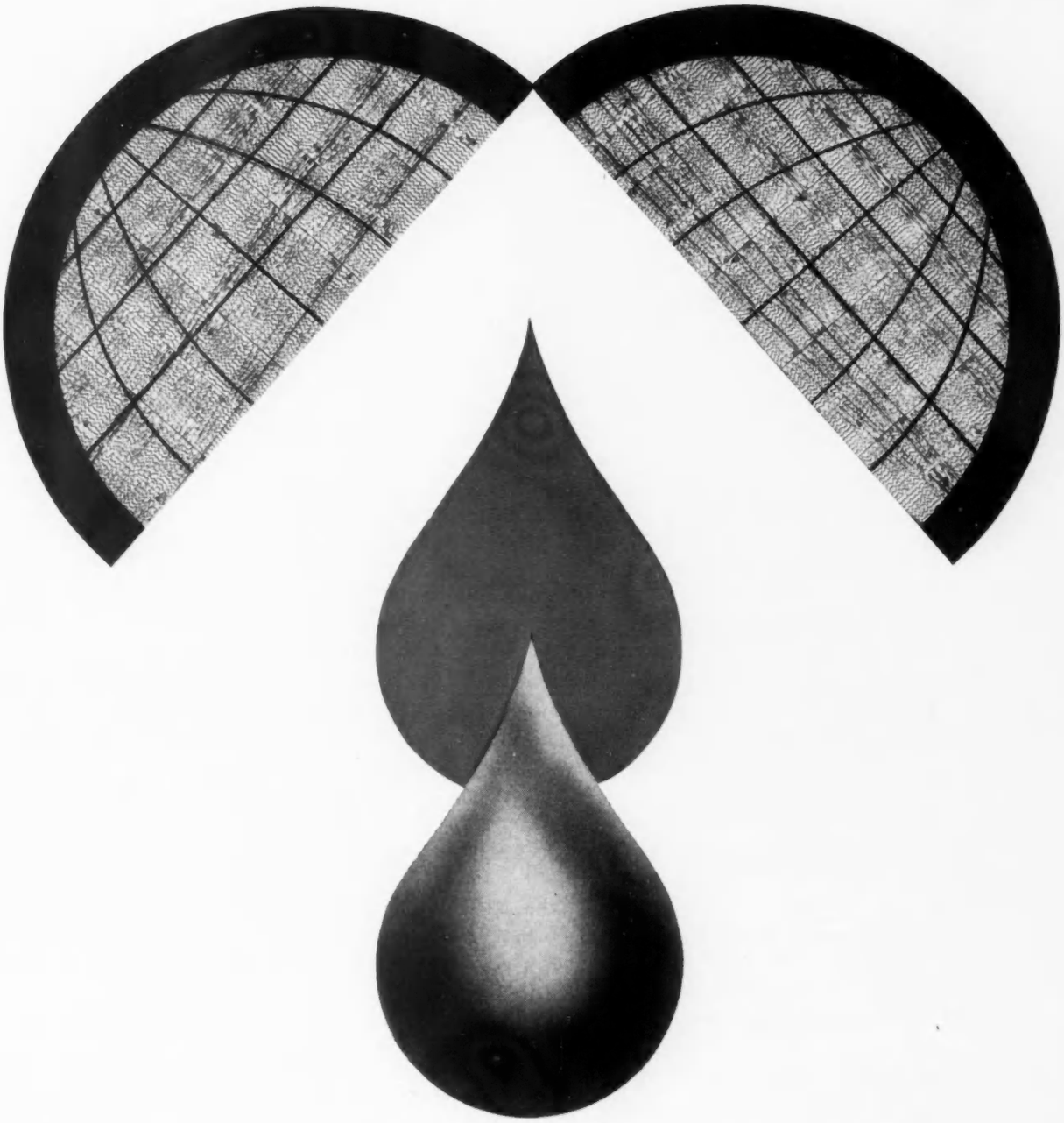

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Good Wells Make Good News

A Monthly Report on Wells That Are Now Worth More

May, 1959

Every day Dowell engineers develop profit-building new ways to use acid to help operators get better production from oil and gas wells. Here are four examples:

- **St. Landry Parish, South Louisiana** (Old Gas Well) Production from the tight Miocene sand between 9533 feet and 9543 feet was only 1600 mcfd, with 62 barrels of distillate per million. With the help of the Dowell engineer, the operator selected a treatment consisting of 2500 gallons Super Mud Acid and 1500 gallons 15 per cent inhibited acid. Both acids had a Dowell silicate control agent added. This treatment was selected because of past success using about 200 gallons Super Mud Acid per foot of pay. After clean-up, gas production rose to 2400 mcfd. The $1725 treatment paid out in two weeks.

- **Hansford County, Texas Panhandle** (New Gas Well) This wildcat was completed through perforations from 6535 to 6546 feet. Producing zone was the Atoka lime. Before treatment, the well tested 1250 mcfd. Dowell acidized using two strengths of acid with silicate control and demulsifying agents added. 5000 gallons of 7½ per cent acid was followed by 6500 gallons of 4 per cent. Treatment was down casing at 9 bpm. After well had cleaned up, it tested 4000 mcfd.

- **Carter County, Oklahoma** (New Oil Well) Before treatment, this well tested only a show of oil. It had been completed into the highly reactive Upper Chimney Hill lime from 7912 to 7922 feet. The operator called Dowell. 7500 gallons of Retarded Acid were used in a treatment to open up a larger drainage area. After clean-up, the well tested 14 boph.

- **Southern Alberta, Canada** (Water Disposal Well) This old oil well was originally completed open hole in the Madison dolomite from 8557 to 8790 feet. After depletion, the operator wanted to convert it to water injection, but well would not take water at 2000 psi. Well was corroded. Also iron hydroxide precipitate had resulted from previous acid jobs, and deposits of paraffin and other heavy hydrocarbons were suspected. To treat all problems simultaneously, Dowell recommended Stabilized Acid and magnesium pellets. 300 pounds of pellets in gelled water were followed by 1000 gallons Stabilized Acid. After clean-up, well took water on vacuum.

In some wells, tailored acid treatments by Dowell have succeeded where all other stimulation efforts have failed. Whatever your production problem, call your Dowell representative. He may be able to save a well that would otherwise be abandoned. For full information, call any of the 165 Dowell service points. In Canada, call Dowell of Canada, Ltd.; in Venezuela, United Oilwell Service. Dowell, Tulsa 1, Oklahoma.

Services for the oil industry DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

When is a public utility not a public utility?

Another example of the federal government's utter disregard of business logic and free enterprise was written into history on April 6.

On that date, FPC Examiner Joseph Zwerdling ruled that Phillips Petroleum Company should have a flat 9¼ percent rate of return, compared with the 18 percent requested by the company. Phillips' computed uniform price based on cost of 18.79 cents per thousand cubic feet was cut to 11.662 cents.

The public utility pattern in its most extreme form also was carried over to prices. Contract prices were wiped out, to be replaced by a single uniform rate schedule. Arm's-length bargaining for future sales was eliminated. Future sales must be made at the uniform rate.

In short, natural gas producers now are public utilities in every sense of Examiner Zwerdling's 343-page decision. This raises a question that should be taken all the way to the Supreme Court, if necessary:

How can natural gas producers be controlled as public utilities when they are not public utilities?

One major test of a public utility is the amount of competition an industry, company or group of companies has. If there is little or no competition, federal control is adopted to protect the consumer.

But no group is any more competitive than natural gas producers. FPC estimates there are more than 5,000 different operators producing gas in the United States. Considering lease partnerships and those not selling in interstate markets, reliable sources place the total number of producers at 8,000.

The natural gas producer is given no exclusive area in which to develop natural gas supplies. He competes vigorously with all other producers seeking reserves. He is not assured a geographically exclusive market for his output. He is afforded no public license of a balance of supply and demand at a price that will afford him a fair return on investment, other than that estimated by public officials.

There is no consistent relationship between capital investment and amount of production. The risk element of the oil and gas industry is well known to be extremely hazardous.

If such a ruling as the Phillips Decision can be made in complete disregard of these factors, what is to stop the federal government from taking over oil, and all industry for that matter? What is to prevent full government control of industry, with prices and profits dictated—with public officials determining what it costs to put a product on the market?

History has proved that government will not stop of its own accord. Only concerted effort on the part of industry and the public can stop the ever-growing, incentive-killing, stifling power of federal control.

There still is time to do something about the Phillips Decision. There will be hearings before the FPC, and possibly appeals to higher courts. Through the highest form of statesmanship, the case for free enterprise must be laid before the public. Oil company stockholders, employes, and the general public must be made to understand what they stand to lose if U.S. industry is shoved completely under the thumb of government controls.

However, it will not be enough to merely plead the natural gas producers' case. A logical, workable plan to replace federal control also must be presented. Industry leaders might even offer such a "radical" solution as letting producers establish prices through open competitive bids to pipe lines, with the FPC policing the procedure.

No matter what the plan, an all-out effort must be made to keep industry free of government shackles.

FIRST ONE-PIECE DRAWWORKS DESIGNED FOR DEEPEST WELLS

SEE IT AT THE
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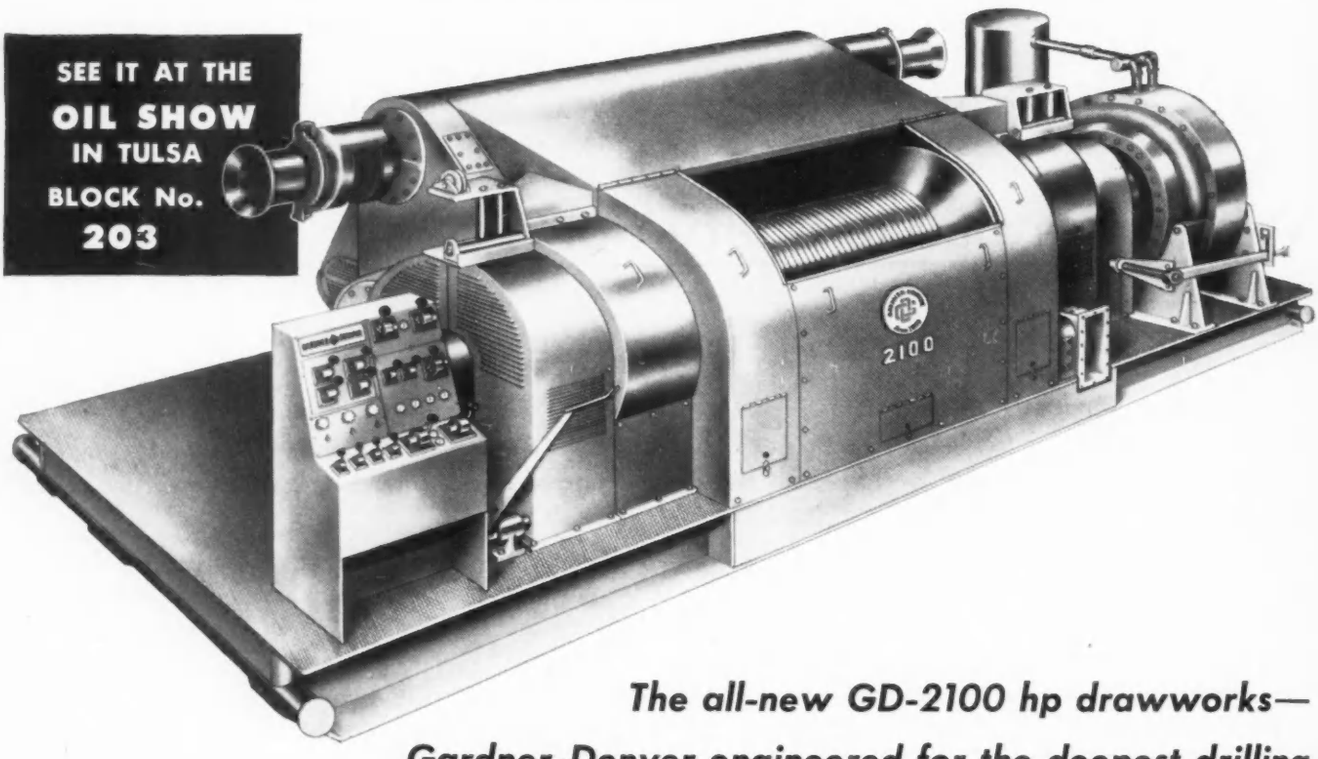
IN TULSA
BLOCK No.
203



The all-new GD-2100 hp drawworks—
Gardner-Denver engineered for the deepest drilling
today and tomorrow . . . more than 130,000-lb. single line pull

ANOTHER OIL FIELD FIRST FROM GARDNER-DENVER

Like the famous Gardner-Denver mud pumps, the new Gardner-Denver drawworks has been engineered for mobility, rugged dependability and simplified maintenance in the field. Like all Gardner-Denver oil field products, the GD-2100 has been built by men who know the field, for there's no substitute for men—our 100-year philosophy of growth.

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For more data on advertised products, use Readers' Service Cards, last page.

Strong demand makes oil outlook favorable

Total demand in first quarter up 6.8% over last year. Gasoline up 7% and residual 12.6%

STRONG DEMAND for petroleum in 1959 is the most important factor causing a generally bright and promising situation in the industry. Market demand is exceeding expectations. Very large volumes of oils are being sold. Crude runs to stills have been heavy in turning out the required amounts of products.

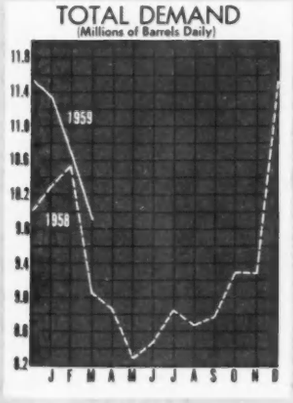
U.S. production of crude oil has been stepped up until it is close to 1 million barrels a day higher than a year ago. Production of natural gas liquids also is above last year's levels. The increase in domestic production has been required in spite of the sharply higher imports of products in the opening months of 1959.

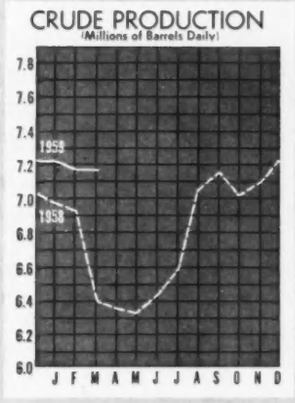
Higher allowables. In the future, with the mandatory, stricter limitations on imports in effect, the markets for domestic oils will be relatively stronger. Crude oil production allowables are expected to be gradually increased. In line with that expectation, Texas allowables will be increased about 100,000 barrels daily for May.

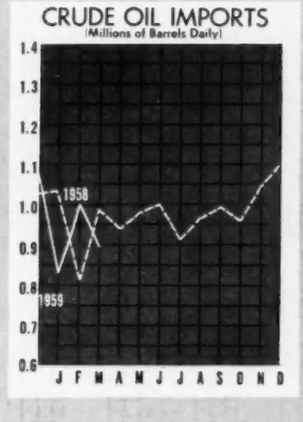
The new import plan became fully operative April 1, when products were brought under control in addition to crude and unfinished oils. The program was expected to reduce total imports to about 1½ million barrels per day. They averaged over 2 million daily in February and March.

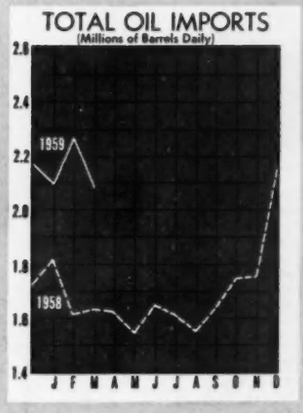
Greater demand. Total demand for all oils averaged 10,636,000 barrels daily in the first quarter of 1959, preliminary statistics show. That was 676,000 barrels a day or 6.8 percent more than demand in the first three months of 1958. The increase was much greater than expected. The U.S. Bureau of Mines around the beginning of this year forecast that total demand in the first quarter would be

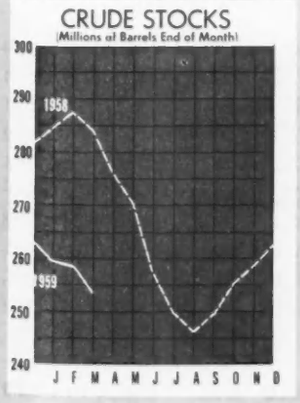
Petroleum Trends...

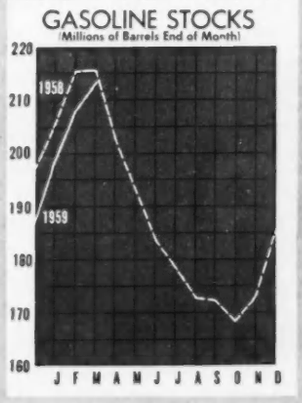


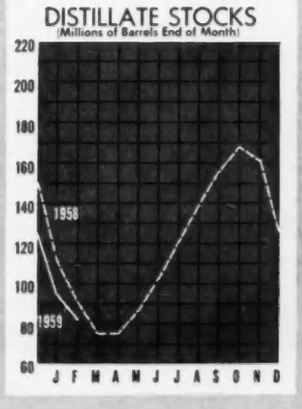


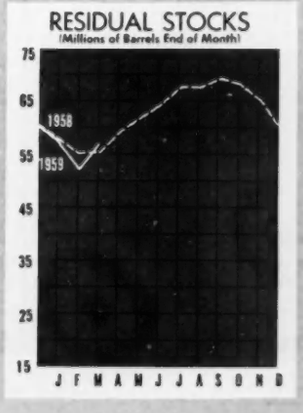












U.S. Petroleum Demand and Supply (Thous. Bbls. Daily)

ITEM	March 1959	March 1958	% Diff.	Feb. 1959	January-March 1959	January-March 1958	% Diff.
DEMAND							
All Oils, Total Demand	9,901	9,079	+ 9.1	10,664	10,636	9,960	+ 6.8
Domestic Demand	9,631	8,805	+ 9.4	10,672	10,373	9,697	+ 7.0
Export Demand	270	274	— 1.5	250	264	263	+ 0.4
Gasoline, Total Demand	3,913	3,569	+ 9.6	3,641	3,777	3,529	+ 7.0
Distillate, Total Demand	2,201	2,075	+ 6.1	2,795	2,706	2,595	+ 4.3
Kerosine, Total Demand	342	357	— 8.8	467	464	503	— 7.8
Residual, Total Demand	1,803	1,568	+15.0	2,038	1,991	1,768	+12.6
CHANGE IN STOCKS							
All Oils, Change in Stocks	+203	—379		—357	—444	—820	
NEW SUPPLY							
Total New Supply	10,104	8,700	+16.1	10,307	10,193	9,140	+11.5
Domestic Production, Total	8,023	7,069	+13.5	8,034	8,048	7,451	+ 8.0
Crude Oil	7,173	6,273	+14.3	7,194	7,197	6,644	+ 8.3
Natural Gas Liquids	850	796	+ 6.8	840	851	807	+ 5.5
Imports, Total	2,081	1,630	+27.7	2,273	2,145	1,719	+24.8
Refined Products	1,193	619	+92.7	1,273	1,210	730	+65.8
Crude Oil, Total	888	1,012	—12.3	1,000	935	959	— 2.5
Crude, East Coast	696	860	—19.1	748	738	803	— 8.1
CRUDE RUNS							
Crude Runs to Stills	8,149	7,356	+10.8	8,079	8,155	7,517	+ 8.5
Domestic Crude	7,209	6,435	+12.0	7,337	7,264	6,589	+10.2
Foreign Crude	940	921	+ 2.1	742	898	928	— 3.2

U.S. Stocks of Oils (Million Bbls. at End of Month)

KIND OF OIL	TOTAL IN U.S Mar. 1959	Mar. 1958	% Diff.	Feb. 1959	EAST OF CALIFORNIA Mar. 1959	Mar. 1958	% Diff.	Feb. 1959
All Oils	752.8	767.5	— 1.9	746.5				
Crude Oil	253.5	278.5	— 9.0	259.1	214.0	234.8	— 8.9	219.3
Gasoline	213.3	218.7	— 2.5	207.5	184.0	189.7	— 3.0	178.8
Distillate Fuel Oil	78.1	75.3	+ 3.7	81.3	64.9	62.8	+ 3.3	70.6
Kerosine	18.4	16.7	+10.2	19.4	18.2	16.3	+11.7	19.0
Residual Fuel Oil	57.9	54.9	+ 5.5	54.7	30.0	25.6	+17.2	26.2

Sources: Except for latest two months, all data in above two tables are from U.S. Bureau of Mines. Last two months are based on American Petroleum Institute weekly reports, Bureau of Mines weekly crude stock reports, and WORLD OIL estimates.

U.S. Crude Oil Production, by States (Thous. Bbls.)

STATE or DISTRICT	Daily Average For Month March 1959	March 1958	% Diff.	Feb. 1959	Total, January-March 1959	1958	% Diff.
Alabama	16.3	16.9	— 3.6	15.6	1,413	1,438	— 1.7
Arkansas	80.3	75.5	+ 6.4	78.1	7,186	7,354	— 2.3
California	838.5	874.7	— 4.1	842.1	75,757	80,243	— 5.6
Colorado	128.8	137.3	— 6.2	128.7	11,484	12,444	— 7.7
Florida	1.2	1.3	— 7.7	1.2	109	113	— 3.5
Illinois	226.5	217.7	+ 4.0	224.4	20,212	20,001	+ 1.0
Indiana	32.0	32.4	— 1.2	33.0	2,959	2,841	+ 4.2
Kansas	330.5	288.8	+ 4.4	327.7	29,838	28,135	+ 6.0
Kentucky	63.8	42.6	+ 49.8	63.7	5,743	3,800	+ 51.1
Louisiana	955.9	819.9	+ 16.6	946.1	85,350	74,967	+ 13.8
North Louisiana	115.5	114.8	+ 0.6	115.5	10,623	10,185	+ 4.3
South Louisiana	840.4	705.1	+ 19.2	830.6	74,727	64,782	+ 15.3
Michigan	24.4	26.1	— 6.5	23.8	2,202	2,276	— 3.2
Mississippi	122.1	105.8	+ 15.4	121.7	10,927	9,239	+ 18.3
Mo.-S. Dak.-Tenn	0.3	0.3		0.3	19	32	— 40.6
Montana	81.0	75.0	+ 8.0	79.7	7,202	6,758	+ 6.6
Nebraska	59.2	50.5	+ 17.2	59.3	5,332	4,798	+ 11.1
Nevada-Washington	0.1	0.1		0.1	41	10	+310.0
New Mexico	291.9	246.6	+ 18.4	283.4	25,472	23,239	+ 9.6
Southeast	256.1	237.7	+ 7.7	253.4	22,777	22,457	+ 1.4
Northwest	35.8	8.9	+302.2	30.0	2,695	782	+244.6
New York	5.1	6.2	— 17.7	5.0	486	574	— 15.3
North Dakota	37.7	36.1	+ 4.4	38.1	3,709	3,596	+ 3.1
Ohio	14.7	17.2	— 14.5	14.4	1,294	1,492	— 13.3
Oklahoma	557.6	516.9	+ 7.9	563.0	50,203	49,788	+ 0.8
Pennsylvania	15.4	18.4	— 16.3	15.3	1,384	1,687	— 18.0
Texas	2,841.3	2,337.2	+ 21.6	2,880.6	259,039	233,990	+ 10.7
Dist. 1: South Central	45.8	44.5	+ 2.9	44.7	4,055	4,179	— 3.0
Dist. 2: Middle Gulf	125.9	101.8	+ 23.7	129.7	11,502	10,792	+ 6.6
Dist. 3: Upper Gulf	407.6	357.4	+ 14.0	420.4	37,376	35,085	+ 6.5
Dist. 4: Lower Gulf	208.5	167.9	+ 24.2	207.5	18,624	17,265	+ 7.9
Dist. 5: East Central	32.3	28.3	+ 14.1	32.3	2,874	2,863	+ 0.4
Dist. 6: Northeast	289.1	231.2	+ 25.0	293.3	26,181	24,139	+ 8.5
Dist. 7-B: North Central	145.1	131.9	+ 10.0	144.2	19,285	12,747	+ 51.3
Dist. 7-C: West Central	136.2	118.0	+ 15.4	143.3	12,692	12,426	+ 2.1
Dist. 8: West	1,134.9	814.5	+ 39.3	1,147.4	102,300	84,662	+ 20.8
Dist. 9: North	208.0	190.9	+ 9.0	209.7	18,878	17,710	+ 6.6
Dist. 10: Panhandle	107.9	107.7	+ 0.2	108.0	9,629	9,598	+ 0.3
Utah	104.6	14.6	616.4	106.9	9,574	1,401	+583.4
Virginia					1	2	— 50.0
West Virginia	5.9	5.9		5.9	518	511	+ 1.4
Wyoming	338.1	309.3	+ 9.3	335.6	30,266	27,204	+ 11.2

SOURCE: Bureau of Mines and API. Texas districts from API and do not necessarily agree with state totals.

up about 368,000 barrels daily or 3.7 percent.

Exports of oils have been about the same this year as last year, as expected. Domestic demand for the first quarter was up 676,000 barrels daily or 7.0 percent.

Exceptional gains. Gasoline and residual fuel oil have been the products causing demand to run materially higher than expected. Total demand for gasoline averaged 3,777,000 barrels daily in the first quarter of 1959, an increase of 248,000 barrels or 7.0 percent over last year. An increase of 2.6 percent had been forecast. Demand for gasoline was especially strong in March, 1959, running 9.6 percent above a year earlier.

Demand for residual fuel oil averaged 1,991,000 barrels daily in the first quarter of 1959, an increase of 223,000 barrels daily or 12.6 percent over 1958. The forecast called for an increase of only 1.2 percent. Residual demand remained strong in March, running 15 percent above last year.

Light fuels. Distillate fuel oil demand has been only a little above the forecast. It averaged 2,706,000 barrels daily in the first quarter, an increase of 89,000 barrels daily or 4.3 percent over last year. In March, 1959, distillate demand was up 126,000 barrels daily or 6.1 percent over last year.

Kerosine demand has been lower in 1959 than in 1958, although it was expected to be about unchanged. For the first quarter it averaged 464,000 barrels daily, down 39,000 barrels or 7.8 percent.

U.S. markets firm. With demand for oils strong, imports curtailed, domestic production reasonable, and inventories of crude and products at satisfactory levels, U.S. markets for crude oil and refined products are generally firm.

This situation is in contrast with the world market, where crude oil remains in over-supply.

Stocks low. U.S. stocks of all oils totaled 752.8 million barrels March 31, 1959, down 15 million barrels or 2 percent from a year earlier. Crude stocks of 253.5 million barrels were down 25 million or 9 percent. Gasoline stocks of 213.3 million barrels were down 5.4 million or 2.5 percent. Distillate stocks were up 3.7 percent, and residual stocks were up 5.5 percent.

looking for oil

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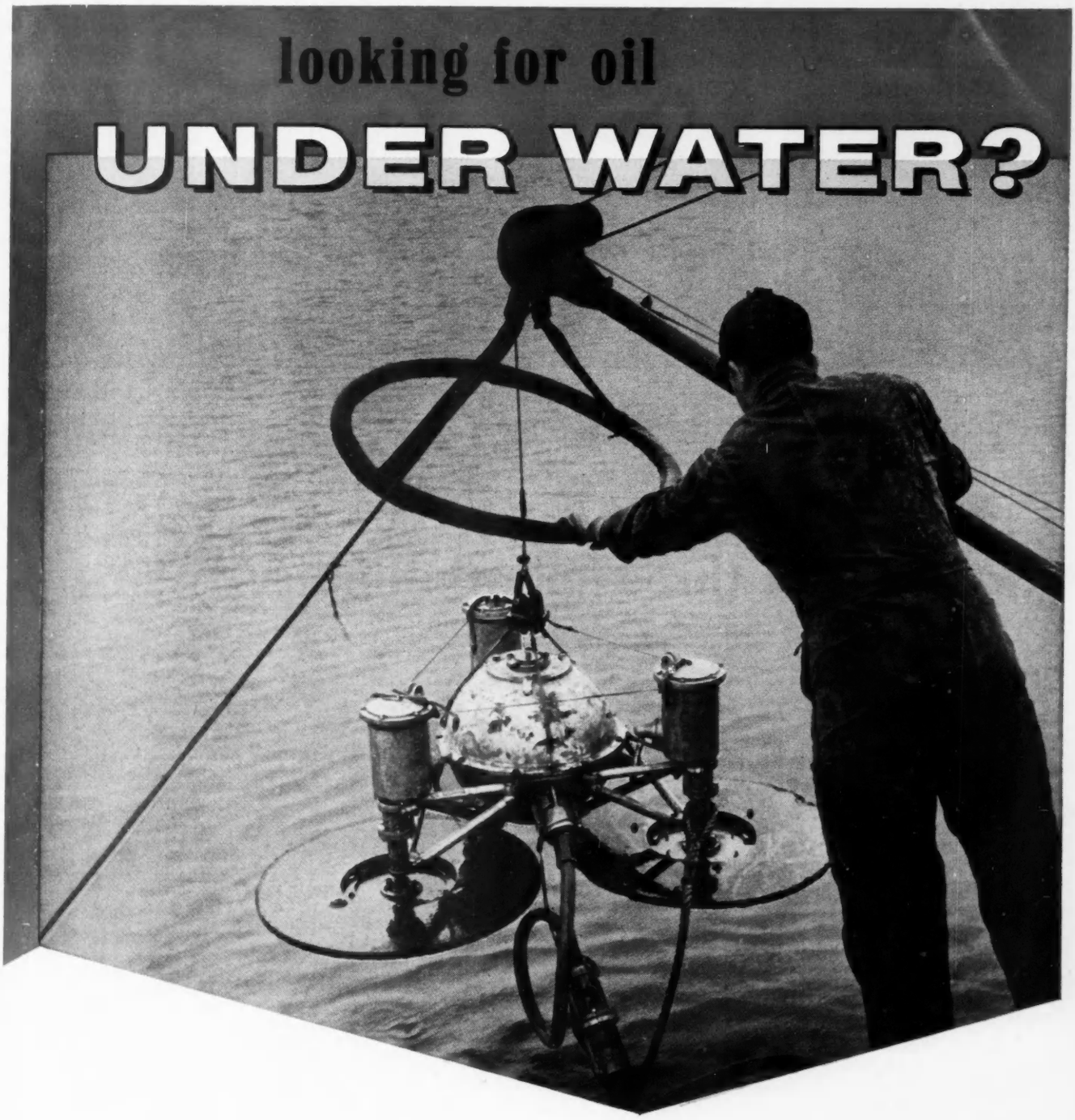

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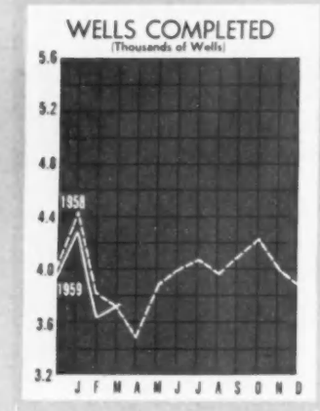
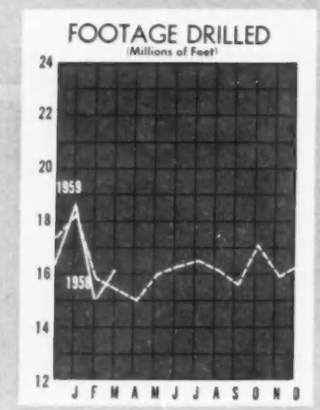
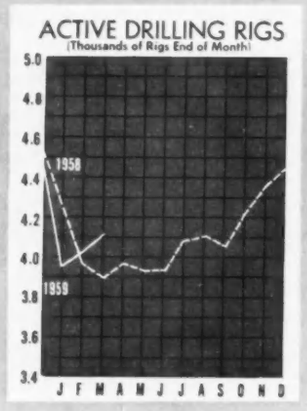
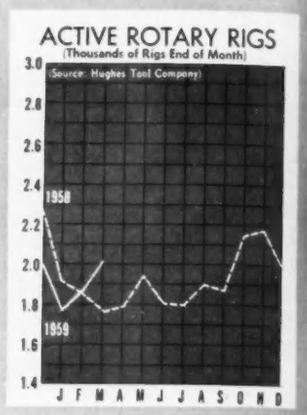
Drilling Activities...









Rig count at three-month high

PROSPECTS FOR easing of tight proration schedules as a result of the new import plan combined with improved weather conditions to stimulate a sharp increase in drilling rig activity during the latter part of March.

Total rigs passed the 4,000 mark for the first time this year, with 4,111 operating on March 31. This was 264 rigs or 7.8 percent more than were operating on February 28, and 298 rigs or 7.8 percent more than were reported at the end of March, 1958.

However, this was the only bright spot in the U.S. drilling picture. Total new completions averaged only 122 wells per day, down 5.4 percent from the 129 wells per day completed in February, and 11.6 percent below the 138 wells completed daily in January. The March, 1959, average was four wells per day, or 3.4 percent better than the March, 1958, average of 118 completions per day.

Total footage drilled was also down in March, averaging 522,600 feet per day, or 2.4 percent below the 535,700 feet per day drilled in February, and 12.4 percent below the January average.

During the first three months of 1959, 11,728 wells were completed and 49.8 million feet of hole were drilled,

Summary of U.S. Drilling Activity

ITEM	March 1959	Feb. 1959	THREE MONTHS January–March 1959	1958	% Diff.
New Wells Completed:					
Oil	1,958	1,846	6,038	5,935	+ 1.7
Distillate	66	70	211	210	+ 0.5
Gas	327	280	918	1,016	— 9.7
Service	78	88	239	329	— 27.4
Dry	1,357	1,353	4,322	4,309	+ 0.3
Total Wells	**3,786**	**3,637**	**11,728**	**11,799**	**— 0.6**
Footage Drilled (Mln. of Feet)	**16.2**	**15.0**	**49.8**	**49.5**	**+ 0.6**

Summary of U.S. Wildcat Drilling

ITEM	March 1959	Feb. 1959	THREE MONTHS January–March 1959	1958	% Diff.
New Field Discoveries:					
Oil	56	42	166	180	— 7.8
Distillate	11	6	27	25	+ 8.0
Gas	22	17	68	59	+ 15.3
Total Discoveries	**89**	**65**	**261**	**264**	**— 1.1**
Dry Wildcats	664	581	2,047	2,093	— 2.2
Total Wildcats	**753**	**646**	**2,308**	**2,357**	**— 2.1**
Percent Productive	11.8	10.1	11.3	11.2	.....
Percent Dry	88.2	89.9	88.7	88.8	.....

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U.S. Drilling Activity in March and First Three Months, 1959-1958

STATE or DISTRICT	TOTAL NEW WELLS COMPLETED AND FOOTAGE DRILLED: DETAILS FOR March, 1959 Oil	Dist.	Gas	Dry	Service Wells	TOTAL NEW WELLS Mar. 1959	Feb. 1959	Mar. 1958	Total Footage March, 1959	DETAILS FOR JANUARY-MARCH NEW WELLS 1959	1958	Percent Diff.	FOOTAGE 1959	1958	WILDCAT DRILLING IN MARCH AND FIRST THREE MONTHS, 1959-1958: DETAILS FOR MARCH, 1959 Oil	Dist.	Gas	Dry	Total Wildcats	DETAILS FOR JANUARY-MARCH Oil	Dist.	Gas	Dry	TOTAL WILDCATS 1959	1958	DRILLING RIGS IN OPERATION (Rigging up, Drilling, Temp. Shut-Down) Mar. 31, 1959	Feb. 28, 1959	Mar. 31, 1958
Alabama	7			3		10	8	7	100,687	30	17	+ 76.5	295,327	172,205				2	2				6	6	6	12	16	14
Alaska				1		1			14,374	2			26,420					1	1	1			1	2		4	5	
Arkansas	35		2	20		57	65	43	196,690	204	153	+ 33.3	670,229	497,476				9	9	1			26	27	34	43	50	40
California	62		5	37	1	105	123	100	578,543	350	409	— 14.4	1,736,962	1,907,797				18	18			4	60	64	57	143	124	147
Colorado	10		3	45		58	54	53	290,117	166	182	— 8.8	880,431	967,817	4			28	32	8		5	80	93	89	64	57	41
Florida							1	2		1	2	— 50.0	4,748	18,942									1	1	2	3	2	
Georgia										1			990										1	1		1	1	
Illinois	42			44		86	119	125	195,021	453	491	— 7.7	1,019,371	1,097,906	2			22	24	2			106	108	129	214	213	236
Indiana	13			29		42	59	27	72,945	174	146	+ 19.2	296,799	237,816				12	12				43	43	38	69	80	103
Kansas	154		13	151	4	322	243	191	1,181,651	892	778	+ 14.7	3,230,673	2,688,565	6		2	80	88	32		7	216	255	181	269	331	258
Kentucky	36		17	35	1	89	160	85	144,313	400	286	+ 39.9	516,151	424,314	1			2	3	3			22	25	19	140	131	89
Louisiana	132	19	11	91		253	296	258	1,980,812	912	832	+ 9.6	7,218,420	6,798,155	1	2	1	24	28	12	4	3	95	114	121	365	256	323
North Louisiana	50	1	5	32		88	119	85	302,488	318	281	+ 13.2	1,173,975	1,091,967				5	5	5	1		27	33	25	55	42	55
South Louisiana	82	18	6	59		165	177	173	1,678,324	594	551	+ 7.8	6,044,445	5,706,188	1	2	1	19	23	7	3	3	68	81	96	310	214	268
*Gulf of Mexico	23	2	1	12		38	32	36	389,055	126	130	— 3.1	1,253,735	1,238,356		1		7	8	1	1	1	8	11	10	52	48	45
Michigan	13		7	25		45	46	28	141,904	130	78	+ 66.7	376,361	221,958				16	16	2			38	40	27	85	89	77
Mississippi	24		2	26		52	32	34	487,595	152	100	+ 52.0	1,417,752	871,630	2			16	18	6			48	54	42	81	68	32
Missouri							2			2			1,364										1	1			3	1
Montana	10			10		20	30	26	109,285	77	83	— 7.2	347,511	481,515				10	10				30	30	37	41	40	31
Nebraska	23			41		64	50	50	388,178	159	143	+ 11.2	921,320	861,783	5			27	32	10			64	74	62	33	43	19
New Mexico	89	1	17	30		137	137	152	584,704	390	545	— 28.5	1,635,019	2,593,155	3	1	1	14	19	10	1	2	40	53	87	183	161	150
Southeast	61		6	18		85	63	87	431,904	216	279	— 23.6	1,064,796	1,409,840	2			10	12	7			31	38	48	90	83	66
Northwest	28	1	11	12		52	74	65	152,800	174	266	— 34.6	570,223	1,183,315	1	1	1	4	7	3	1	2	9	15	39	93	81	84
New York	24		1	2	18	45	45	45	53,400	135	135		160,200	160,200												42	42	42
North Dakota	20			11		31	36	21	195,858	103	95	+ 8.4	646,400	660,061	1			5	6	4			19	23	25	51	45	39
Ohio	32		26	18		76	67	89	204,732	216	235	— 8.1	581,322	624,724				1	1	2			2	4	2	199	202	205
Oklahoma	282	8	45	234	15	584	499	660	2,011,254	1,676	1,798	— 6.8	5,628,644	5,770,960	3	3	3	75	84	15	5	11	202	233	171	442	435	484
Pennsylvania	15		34	5	6	60	61	60	189,214	176	173	+ 1.7	538,884	516,378				1	1			1	3	4	6	180	183	180
South Dakota				2		2	3		2,850	5	3	+ 66.7	14,161	16,991				2	2				4	4	3	2	2	
Tennessee			1	4		5	5	5	6,000	15	15		18,000	18,550				2	2				6	6	6			
Texas	879	38	86	457	31	1,491	1,356	1,412	6,459,077	4,454	4,564	— 2.4	19,681,856	19,735,247	28	5	13	283	329	55	16	29	851	951	1,121	1,089	962	984
Dist. 1: South Central	76	1	2	31		110	69	102	248,705	268	264	+ 1.5	677,185	651,867	1			25	26	2		1	71	74	89	34	28	40
Dist. 2: Middle Gulf	18	11	6	28		63	46	76	375,837	178	161	+ 10.6	1,098,393	979,274	2	2	1	20	25	5	4	4	52	65	45	64	43	43
Dist. 3: Upper Gulf	37	7	4	25		73	86	109	521,731	266	331	— 19.6	1,937,947	2,182,644		2		14	16	1	8	2	53	64	82	88	66	72
*Gulf of Mexico										2	2	—100.0		15,685											1	1	1	
Dist. 4: Lower Gulf -S.W	32	17	15	42		106	91	109	633,200	310	296	+ 4.7	1,763,942	1,535,334	2	1	1	28	32	6	3	1	87	97	124	90	59	60
*Gulf of Mexico								2			2	—100.0		31,399														2
Dist. 5: East Central	2		1	7		10	11	13	62,750	34	48	— 29.2	198,658	180,409				3	3				15	15	27	10	6	8
Dist. 6: Northeast	34		8	20		62	55	54	353,083	193	230	— 16.1	1,075,357	1,225,306	1		1	12	14	2		2	39	43	55	50	43	51
Dist. 7-B: North Central	120		4	96	1	221	199	145	698,526	624	548	+ 13.9	1,989,027	1,797,301	7		1	57	65	12		3	187	202	212	110	95	97
Dist. 7-C: West Central	31		7	18	1	57	54	70	263,378	168	237	— 29.1	733,442	1,256,610	3		2	14	19	5		5	42	52	73	72	66	71
Dist. 8: West	319		9	73	12	413	385	361	2,064,196	1,268	1,081	+ 17.3	6,347,460	5,352,239	9		2	53	64	15		3	145	163	144	334	302	301
Dist. 9: North	165		9	103	15	292	263	258	845,195	855	1,034	— 17.3	2,445,829	3,084,099	2			48	50	3			128	131	230	142	166	143
Dist. 10: Panhandle	45	2	21	14	2	84	97	115	392,476	290	334	— 13.2	1,414,616	1,490,164	1		5	9	15	4	1	8	32	45	40	95	88	98
Utah	21			6	1	28	21	49	162,399	83	130	— 36.2	489,731	733,957				3	3			1	24	25	25	45	46	45
Washington											3	—100.0		18,557											2			1
West Virginia	11		52	8		71	59	71	205,156	188	212	— 11.3	493,709	569,132											2	213	177	213
Wyoming	24		5	22	1	52	59	55	257,092	181	190	— 4.7	946,253	842,235			2	11	13	3	1	5	57	66	62	86	77	50
Others							1			1	1		2,000	590									1	1	1	12	6	9
Total United States	1,958	66	327	1,357	78	3,786	3,637	3,648	16,213,851	11,728	11,799	— 0.6	49,797,008	49,508,616	56	11	22	664	753	166	27	68	2,047	2,308	2,357	4,111	3,847	3,813
Total Western Canada	100		15	65		180	193	258	935,000	562	668	— 15.9	2,918,243	3,418,190												214	253	165

* Gulf of Mexico wells are included in their respective district totals.

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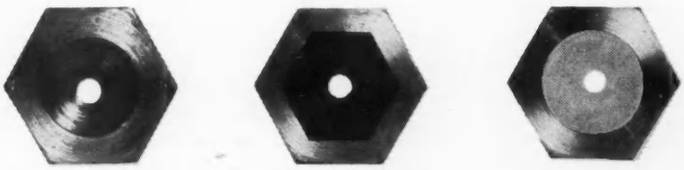
GULFCO'S TYPE AB CHOKE

Now, new from Gulfco, a choke that features maximum compactness, maximum simplicity, and maximum interchangeability—from an adjustable Type AB to a positive Type RB as easy as a twist of the wrist. Solve flow control problems with this quality-controlled precision product engineered by Gulfco.

Pinpoint Accuracy

The Gulfco Type AB choke provides maximum control on fractional flow settings with Gulfco's Index Dial. This Gulfco engineered dial gives extremely accurate readings by the use of an index slot which shows only a single figure at a time in the complete range from the fully closed position to full open (48/64").



POSITIVE INSERT | **PRORATION INSERT** | **CERAMIC INSERT**

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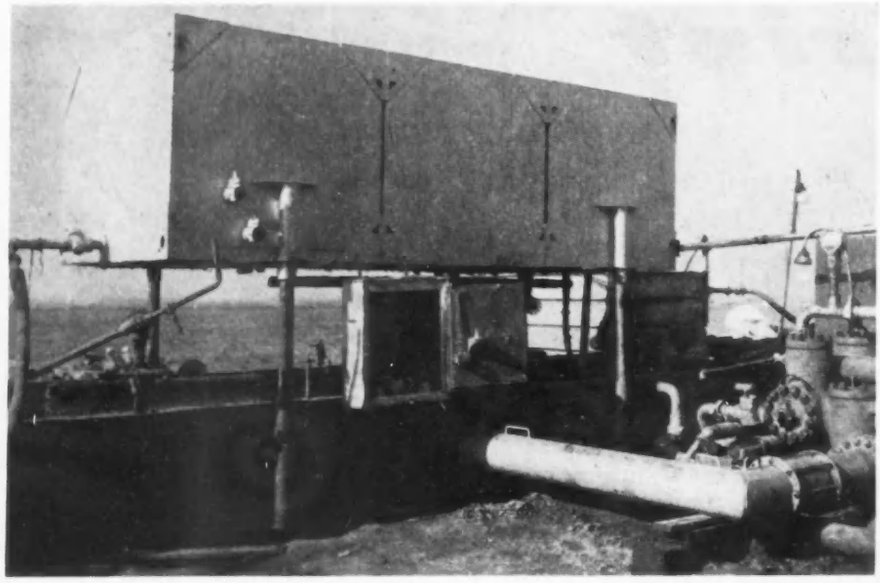
Practical Operating Hints

These **How-To-Do-It** Ideas Can Save You Money

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas



Removable Posts Support Water Tank

Without bracing or specially-designed supporting devices, a rectangular water tank easily can be mounted in an elevated position above the mud suction pit to save space; also provide a moderate head for the water system.

Four pipe sockets are welded in an inverted position on the sides of the water tank and at matching points on the mud tank, four sockets are welded in an upright position. When the water tank is to be installed, four identical posts of 3½-inch drill pipe are set inside the mud tank sockets and when the water tank is raised by the crane, the sockets on that unit are set down over the tops of the posts. The resulting support is inexpensive to build, requires no special aligning or leveling once the mud suction pit is positioned.

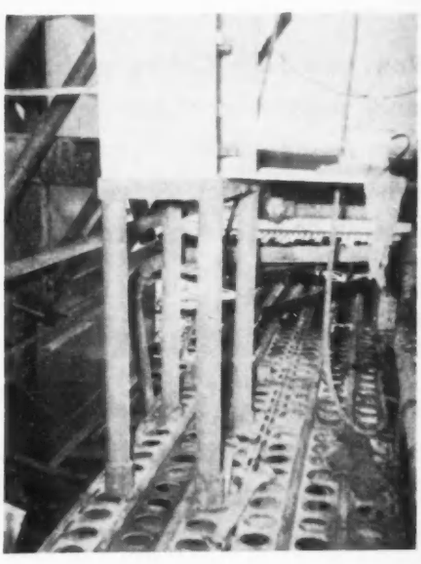
The sockets offer no problem during the moving of the tanks and the posts offer little or no obstruction to normal work around the tanks. Should there be need at some future date to raise or lower the tank to suit changed rig conditions, it is a simple matter to merely cut a set of longer or shorter posts.

Extend Axel on Pump Unit And Improve Roadability

Extending the axle of the typical gas-engine powered utility pump by from two to three feet can improve road stability and simplify rigging-up at the job site.

In the installation shown, the regular axle was cut and the sections rewelded to the ends of the pipe axle extension. This wider wheel base is more suited to the rough roads encountered in the field and shaking-up and resultant damage to both the pump and engine occurs during field moves.

Levelling problems at the site also are reduced by the wider wheel base since minor irregularities of the surface normally can be spanned. The telescoping adjustable tongue support visible beyond the unit provides additional stability and ease of levelling at the job location.

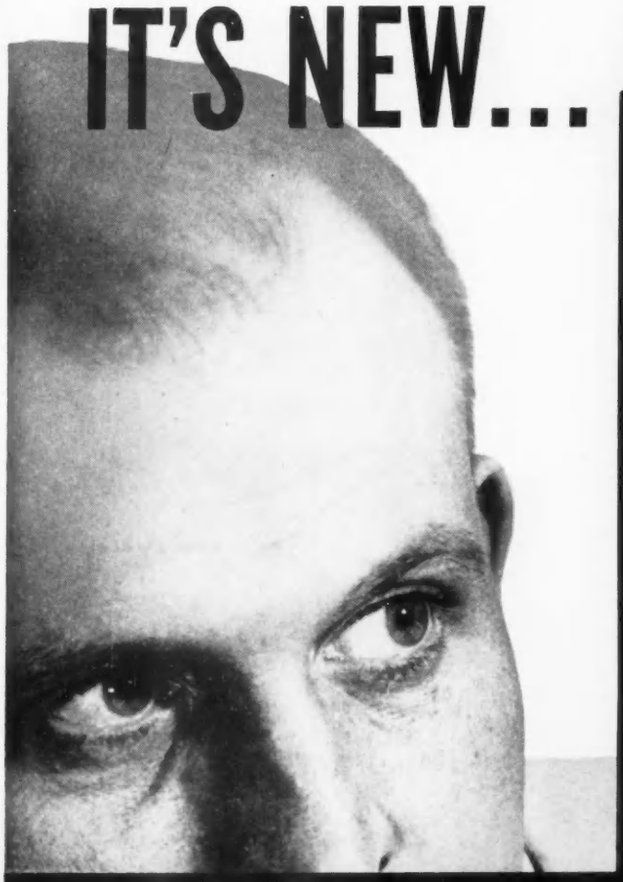


Construct Pipe Stand For Mud Testing Cabinet

One contractor wanted his mud testing equipment as close to the shaker as possible. He didn't want the extra expense of a hut or a sink-shelf set up so he constructed a stand of convenient height on which he placed his mud testing cabinet.

The stand is made from four pieces of pipe, a rectangular piece of sheet metal and four small strips of metal. The pipes are welded at the corners of the sheet metal to form the legs and stand top. The strip metal is welded around the edge of the stand top to form the rim. The rim serves to hold the cabinet more securely in place.

IT'S NEW....



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Metal Holder Keeps Fire Extinguisher Ready

A fire extinguisher may never need to be used around your tank battery, but it is certainly a good idea to have it available and in good operating condition. If the extinguisher is not kept in a protected spot it may become damaged by personnel working around the battery or by the elements.

A holder for the extinguisher should be built so the extinguisher will be readily available if a fire should break out. The illustrated holder should fill the bill as it is situated at the entrance to the tank battery and has an open front. It is constructed from five pieces of sheet metal welded together and a pole for the support.

The sheet metal forms a holder with two sides, a back, bottom and a sloping top with overhangs to facilitate drainage in wet weather. The holder is secured to the pipe support by means of steel straps.

Storage Hooks Reduce Cable Maintenance Costs

A good housekeeping practice that yields direct benefits in reduced cable maintenance costs is illustrated in the accompanying photograph. A series of 10 large hooks made of sucker rod material was welded along the length of one side of the combination generator-tool house.

On these hooks are hung loops of excess cable for each of the several rig circuits. The practice not only keeps the rig premises in a much tidier condition, but directly affects repair and maintenance of cables which, when allowed to remain on the ground, are vulnerable to physical damage as well as rubber deterioration due to sunlight and moisture.

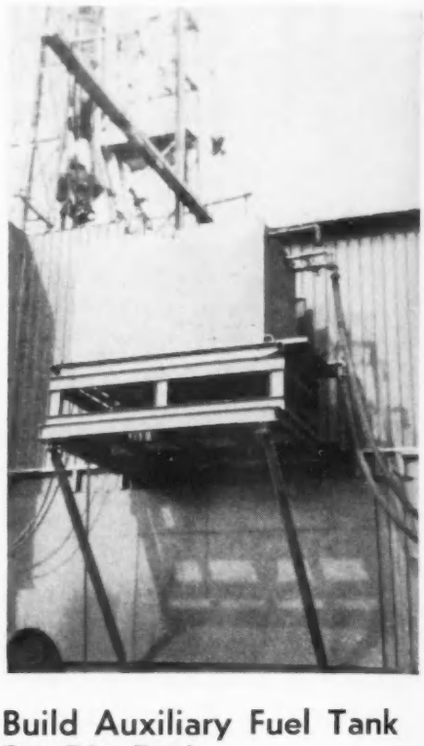
Availability of the hooks also encourages crewmen to hang up apparel and miscellaneous gear that otherwise might be scattered elsewhere about the location.

Extended Legs on Ladder Good Safety Feature

A little ingenuity can often turn a hazardous practice into a safe one. An example is illustrated here where a mechanic extended the legs of a ladder to form a hand rail on the top of a tank.

The ladder is made of welded pipe and it is customary to cut the legs off a couple of feet above the tank. Once a worker steps on to the top of the tank he has no support. Minor accidents might occur if the top of the tank was wet with oil or water. The curved supports provide a hand rail for the worker until he is on the tank and has checked his footing.

To provide the hand railings, the pipe was cut and welded to the desired shape. It could also be bent to shape if the necessary facilities were available.



Build Auxiliary Fuel Tank For Rig Engines

On the illustrated rig, the diesel engines are mounted on the same level as the drawworks. Since an ordinary fuel pump could not satisfactorily deliver fuel to the engines, a small fuel reservoir was mounted on a level above these engines so they could be gravity-fed. The fuel is pumped from the fuel tank on the ground to the top of the reservoir and it flows by gravity to the diesel engines.

The auxiliary fuel tank is skid-mounted and has hooks for easy moving. It is mounted on a platform extending out from the rig floor.

Pipe Under Pumping Unit Avoids Possible Accidents

Here is a simple, cheap method for preventing accidents around pumping units. As shown, some types of pump-

No rotation is necessary with this tool

***No rotation is necessary* with this tool during drill stem testing operations.**

You can take as many bottom hole shut-in pressures as you want without returning the testing valve assembly to surface.

You can also squeeze cement, re-perforate, fracture or acidize without ever pulling the tubing or drill pipe.

Then, if you need later tests, you can pump the pressure test section in place without ever making a round trip.

You can do all these things with full assurance that you are using a positive tool that is completely safe in operation. There is no guesswork. All operations involve simple up-and-down movement or a minimum of right hand rotation. No damage results from excessive rotation. No left hand rotation is ever required.

After all operations are completed, a built-in jar assures packer unseating when unseating is desired.

In addition, this tool is backed by Johnston Testers —the largest operator in the field of drill stem testing. You get all the advantages of Johnston's unparalleled experience when you specify the *Johnston* Test and Completion Tool. Fill out the coupon or drop us a note on your letterhead for full information. Please refer to bulletin number A6.3.

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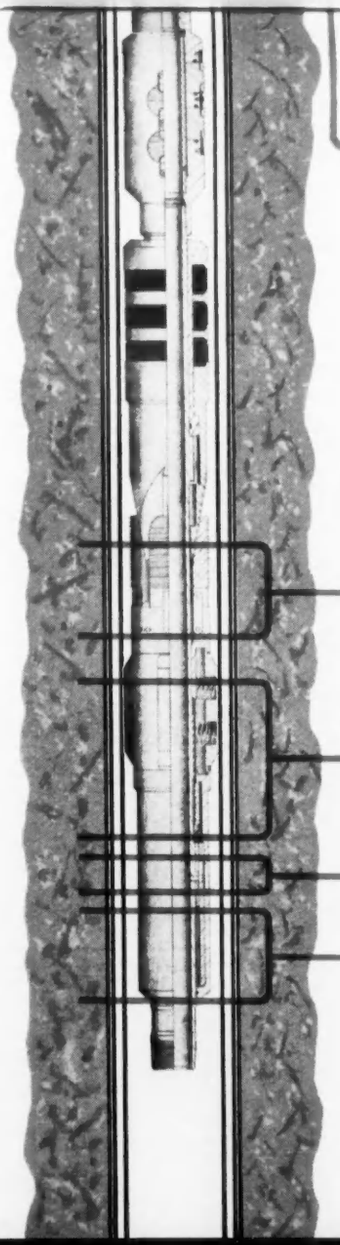

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TWO-WAY ANCHOR SLIPS enable the operator to take a strain on the tubing without unseating the packer.

BUILT-IN JAR makes it easy to unseat packer. As in all other operations, no left hand rotation is required to operate or reset.

SIMPLE SETTING OF PACKER. Just pick up, torque to the right and slack-off, and the packer is set. The by-pass valve, which is closed when the packer is set, has a simple and positive opening and closing action.

FULL OPENING THROUGH TOOL (when testing valve assembly is out) permits perforating, squeezing, and other operations without difficulty.

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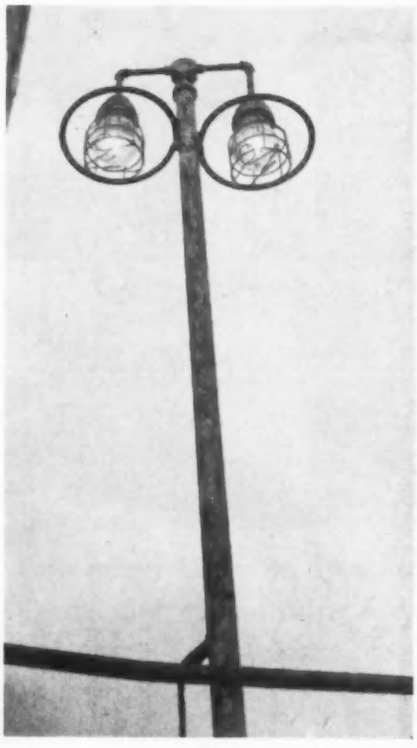
ing units have weights exposed to open areas at the rear of the unit installation. In some cases it is possible for personnel, livestock or equipment to be struck by these weights while the unit is in operation. Serious injury, and considerable monetary loss can be experienced if extreme caution is not exercised around such units.

The installation illustrated here can prevent such occurrences at a minimum cost. The vertical piece of 4- or 6-inch pipe is driven into the ground and set in concrete immediately beneath each set of weights. This prevents vehicles from passing directly under the weights and provides personnel with a warning obstacle.

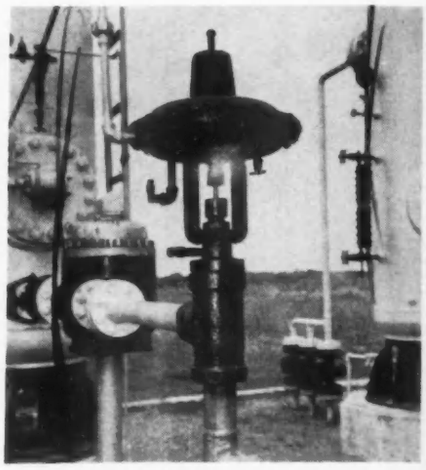
Due to its simplicity, the riser can quickly and easily be installed on all applicable locations in very short time.



Protect Light Fixtures With Ring Guards

Added protection against damage during rigging-up, drilling and moving can be provided inexpensively for rig lighting standards using the method employed by one contractor. When the light standard is built and the fixtures installed, two 15-inch rings of either light pipe or sucker rod material are welded opposite the mid-points of the globes as shown.

In addition to affording protection when the light standards are being moved between locations, the rings minimize the chances of light breakage—and possible resultant fire hazard should gas be present at the time—by wire lines, tools or other equipment used on the derrick floor and surrounding area.



Convert Motor Valve to Snap Acting Operation

Here is an excellent method used to change a motor valve from throttle to snap acting operation. The arrangement is used when a throttle type liquid level control pilot is provided on the original installation and it is not desired to purchase a snap acting unit.

The motor valve, shown in the photograph, is located on the distillate dump line of a separator, downstream from a liquid meter. The separator originally was equipped with a throttle type liquid level pilot. Due to inaccurate meter readings it was decided to change the operation of the dump valve to snap operation. Since the cost of an additional snap pilot and the junking of the throttle pilot made a new purchase prohibitive in this particular case, other methods were considered.

First, the ¼-inch plug located in the lower diaphragm case of the motor valve was removed. The plug normally is in place while the valve is throttle operated. A ¼-inch nipple and ell were inserted in the discharge port as shown in the photograph. A ¼-inch male x ⅛-inch male brass ell connection then was inserted in the ¼-inch ell. A small ball bearing then was placed at the inside upset of the ⅛-inch male connection of the brass ell. A ⅛-inch male x ⅛-inch female brass tubing connector then was placed over the ball bearing. The ⅛-inch female end of the connector

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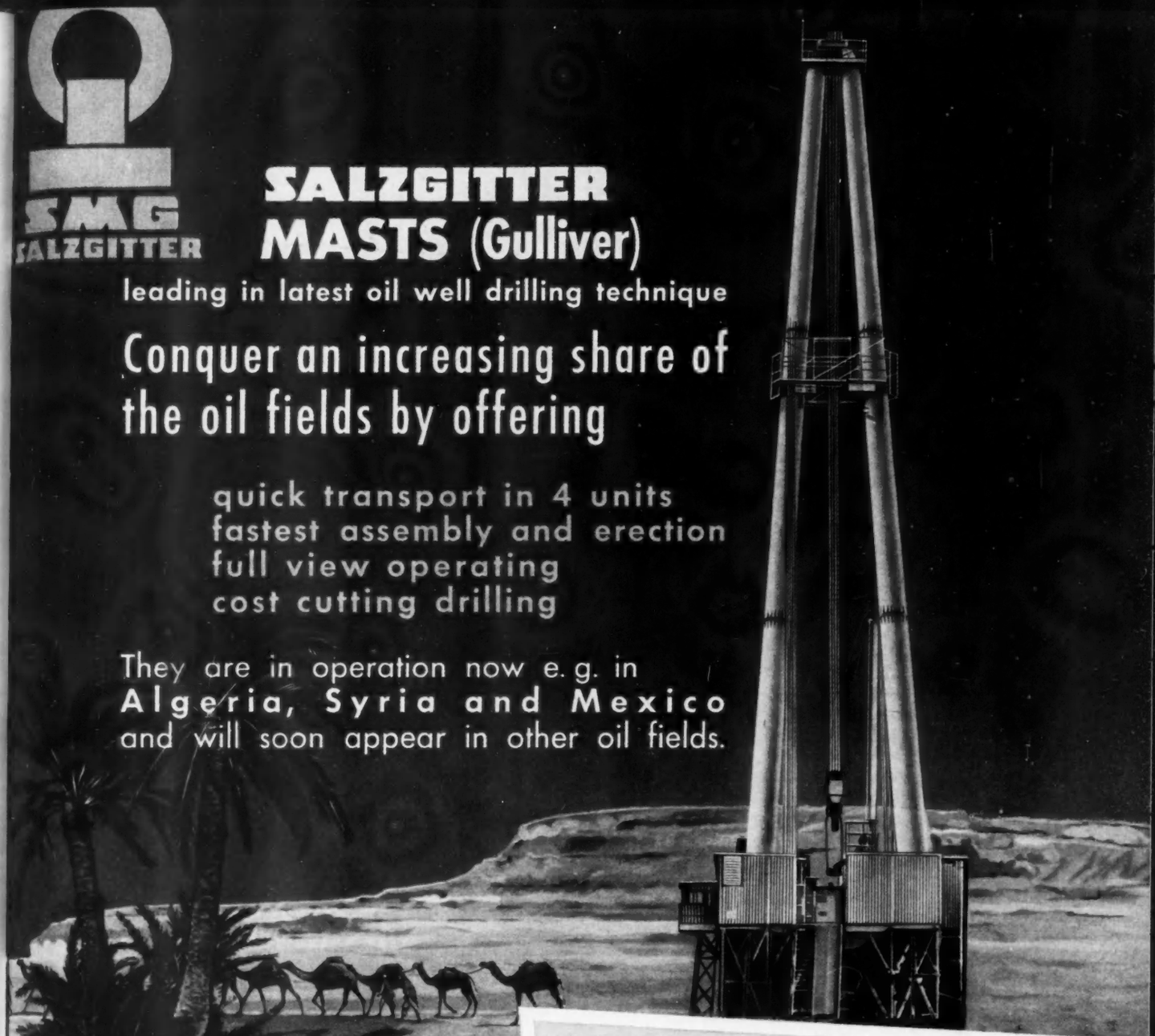

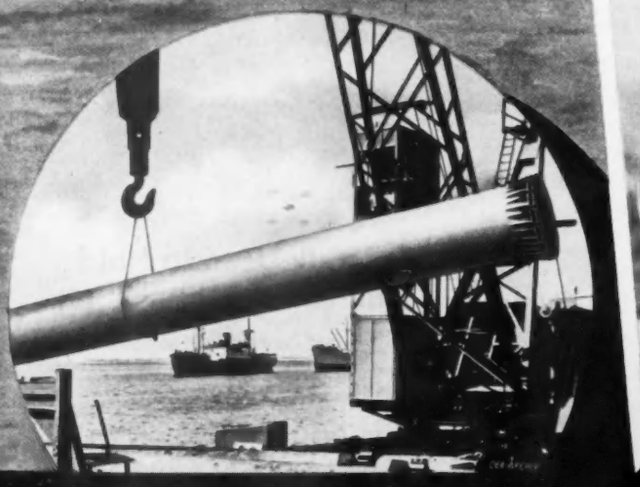

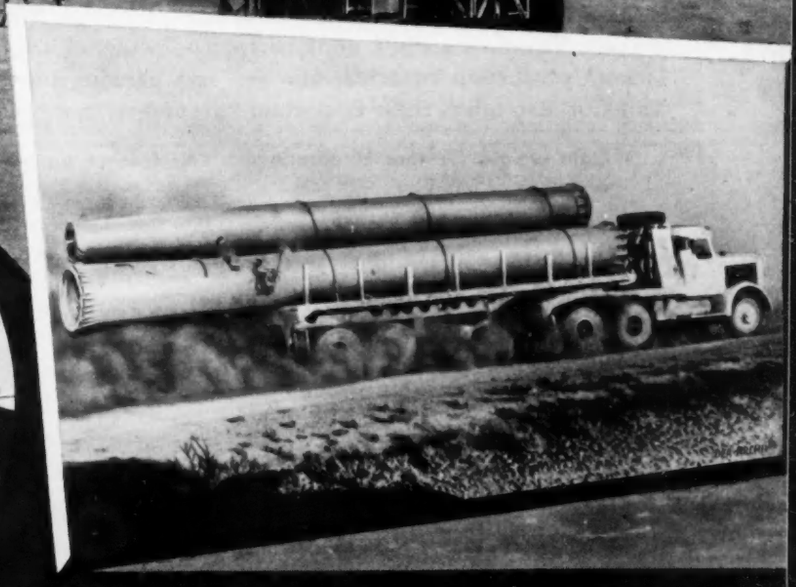

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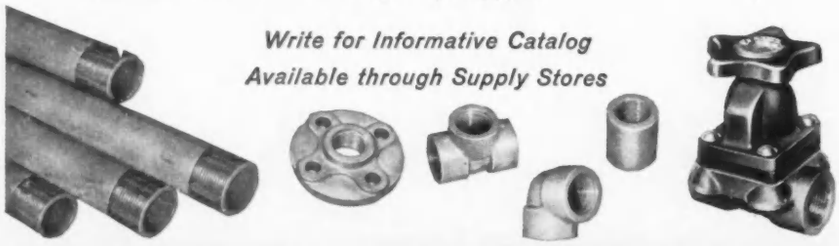

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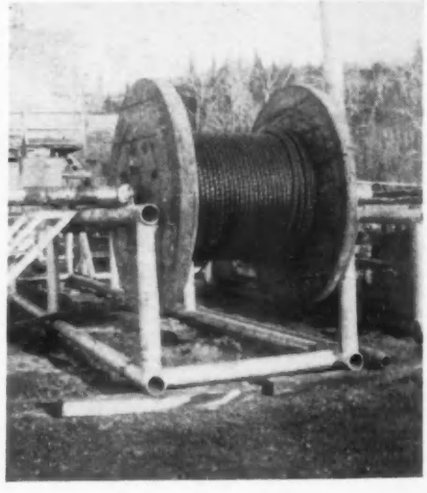
was made up on the ⅛-inch pin of the brass ell with the bearing inside. This completed the conversion.

The valve now operates as follows: When the throttle pilot is actuated by the separator float, a small quantity of supply gas is directed to the motor valve diaphragm case. Normally, this would tend to open the valve slightly. However, with the conversion equipment this small quantity of gas passes around the bearing in the brass connection to atmosphere and the motor valve remains closed. As the separator float continues to rise, the throttle pilot tends to send more supply gas to the valve diaphragm case. Finally, when the throttle pilot is fully actuated, the total quantity of supply gas available is directed to the valve diaphragm. This is too great a quantity of gas that can be passed around the bearing in the brass connection. With the increased volume of supply gas, the bearing tends to seat against the inner upset of the brass filling, thus placing full supply pressure on the valve diaphragm and opening the valve with "snap" motion. When the pilot bleeds gas from the diaphragm, the bearing falls away from its seat.



Catwalk Used to Hold Drill Line Spools

There have been several methods designed for the purpose of holding the drill line spools. Here is a Canadian contractor who utilizes the end of the catwalk for such a purpose.

This method has proven very successful by eliminating the necessity of transporting an added drilling line support from location to location.

Use Old Pipe To Support New Pipe

Making adequate supports for pipes on a location or around a tank battery can present quite a problem. Here is an answer that is not only simple and inexpensive to make and install but will provide plenty of support under almost any condition.

This support is made of used pipe, the diameter depending upon the size pipe being supported. It is split longitudinally either with a hacksaw or a welding torch at one end a sufficient distance to fit the line it supports. With small pipe, the split halves can be bent back and hammered flat. Larger supports, such as the one illustrated, may be heated before they are formed to fit the line.

Once shaped they are driven into the ground in the proper position and the flow line or supported pipe is lowered into place. No precise welding or cutting is required and a variety of lengths are easily made to accommodate uneven terrain.

How-To-Do-It Ideas Earn Money, too!

WORLD OIL editors want how-to-do-it ideas, so your favorite short cut or invention could put money in your pocket! Write down the substance of your latest ideas and send them in with a picture or drawing of the installation . . . if accepted, $10 for each idea will be yours. Send those money-making ideas today to Hints Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

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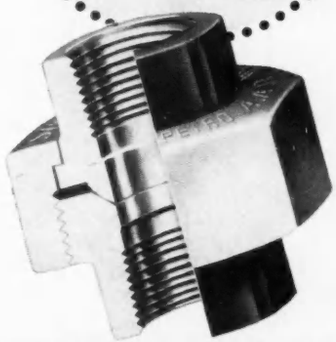

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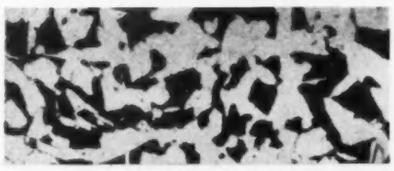
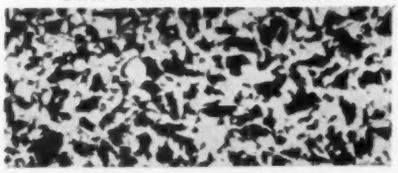


GRAIN SIZE BEFORE FORGING



GRAIN SIZE AFTER FORGING

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Adjustable Stops Aid Spacing on Drum Rack

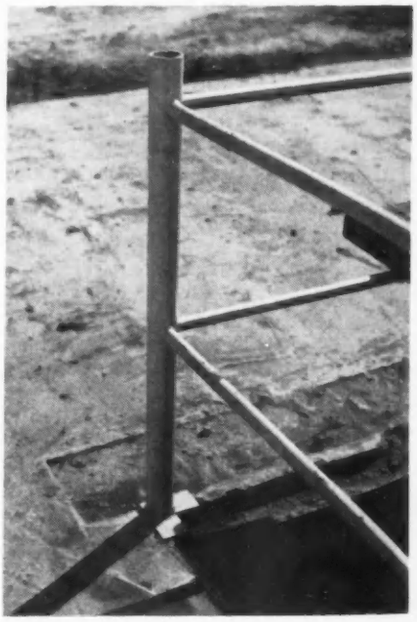
An adjustable stop device that can be adapted to any drum rack; one which can be adjusted to suit changing conditions as drums of varying diameters are used, easily can be made by a welder.

Shown in the accompanying photograph, the device, one for each side of the two-bar rack, consists of a stop made by welding a triangular piece

of ½-inch plate to a short half-section of pipe that rests atop and fits the curvature of the drum rack rail. Welded to the convex side of this half-section of pipe, and not visible in the photograph, is a 1-inch length of round bar which projects downward and which can be dropped into any one of the four matching holes burned into the top surface of the rail.

A short piece of chain welded between the movable piece and the rack prevents the units being lost during moving operations. A similar set of stops is installed on the opposite end of the drum rack.

When the rack is filled, the stops are moved up as necessary to hold the drums together snugly. When a drum is to be rolled off, it is but a matter of a second to lift off the stops and drop them off to one side to provide uninterrupted movement along the rails.



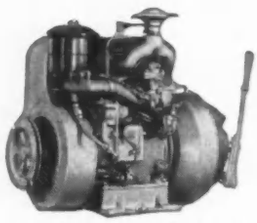
Iron Base Holds Guard Posts Around Well Cellar

Building a guard rail around the flowing well cellar often involves drilling holes or constructing special bases for the guard rail corner posts.

One method which eliminates this preliminary work is illustrated in the accompanying photograph. To the bottom of each post is welded a small 90-degree angle base made by welding together two pieces of 2-inch angle iron as shown.

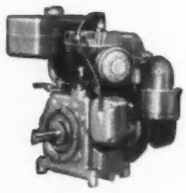
This base, designed to fit the cellar corner in the small shelf on which the

WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINES



Model THPD Oil Well Pumping Engine with heavy-duty clutch and extra flywheel for developing follow-through High Momentum Factor.

have the **GUTS** for rugged Oil Field Service



Models ACN-BKN single cylinder 3- to 7-hp. (smallest engines in the Wisconsin line).

ROUGH-AND-READY oil field service calls for everything you can put into an engine — for on-the-job endurance, long life, self-sustaining dependability, low-cost operation and maintenance. You get it all in *all* Wisconsin Engines, regardless of type or hp. rating.

Even the smallest Wisconsin single-cylinder models have basic features such as: tapered roller main bearings . . . at *both* ends of the drop-forged, counterbalanced, heat-treated crankshaft; 4 piston rings for a tight power seal and protection against excessive cylinder wear; an outside-mounted, weather-tight high-tension rotary-type magneto, equipped with Impulse Coupling for fast starts in any weather; positive pump-circulated lubrication . . . and many other "plus value" features.

A complete power range from 3 to 56 hp. offers selectivity to fit the job and the machine. All models are designed for efficient operation at all temperatures from low sub-zero to 140° F., and can be supplied with Electric Starting, Automatic High Temp. Safety Switch. Buyer's choice of fuel systems: gasoline, natural gas, LPG or combination gas and gasoline.

These are some of the reasons why you can't do better than to specify "WISCONSIN" for your oil field utility units.

Tapered roller main bearings take up radial loads and end thrust . . . protect against bearing failure.

Positive lubrication . . . forged connecting rods with heavy-duty bearings.

Heavy-duty, weather-sealed outside magneto with Impulse Coupling.

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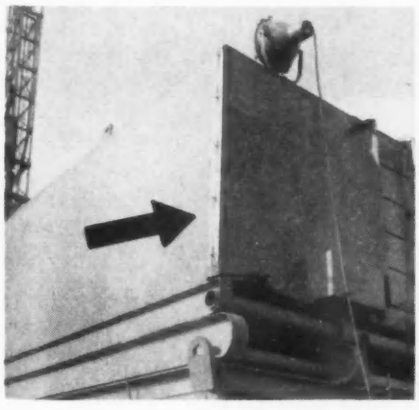
cellar 2-inch planking rests, fulfills two needs: (1) the post cannot be moved accidentally, or removed, without lifting the entire guard rail; and (2) it fits an existing condition of the cellar and requires no further welding, drilling of holes or pouring of concrete.

Depending upon how tightly the cellar planking fits the opening, it may be necessary to notch the ends of the two planks by perhaps one-half inch to allow insertion of the angle iron base unit at the corner.

Guard on Water Pump Jack Prevents Accidents

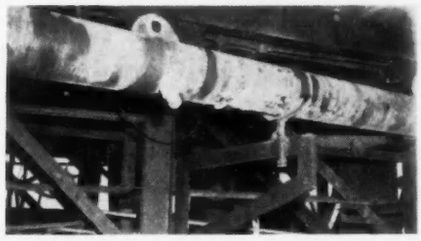
A simple guard made of 1¼-inch by 1¼-inch angle iron and expanded metal will serve as a protective device around the working parts of a water pump jack. The guard is bolted to the frame of the pump and can be easily removed if repairs are necessary.



Clear Plastic Tubing Makes Unbreakable Fuel Gage

A liquid level indicator for the diesel fuel tank, one which does not involve either a float system or the vulnerable gage glass, is employed by one drilling contractor. From an outlet at the bottom of the tank, a length of clear plastic tubing extends up the tank, in front of a gallonage scale painted in black on a white background. The tubing is held in a near-vertical position by five equally-spaced eye-bolts spot welded to the side of the tank.

The prime advantage of this type of indicator is the lack of vulnerability to breakage during moving operations. The fluid level easily is seen and can be read as closely as is necessary for such a tank. If and when the tubing deteriorates or becomes dirty, it is easily replaced at negligible cost.

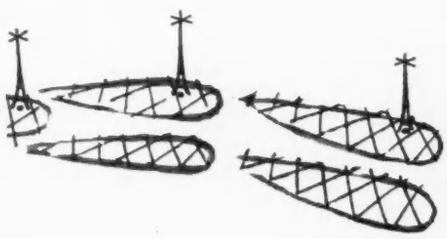


Hinged Bracket Supports Mud Return Flow Line

A hinged mud return flow line support that can be swung outward to

FROM NEWFOUNDLAND TO NEW GUINEA

. . . more than 20 mobile Decca chains are currently deployed to cover air, marine and ground survey and exploration projects. In addition to the 5,000 ships and aircraft using the permanent European and Canadian Decca Navigator networks, a considerable proportion employ the system as an aid to survey and other operations requiring continuous position-fixing of high accuracy. Recent developments relevant to the use of Decca for surveying include a substantial improvement in the portability of the mobile transmitting stations—a complete chain has been transported to the



sites by helicopter—and the introduction of an automatic dead reckoning element into the Decometer and Flight Log display systems. This device*, already used with marked success in two airborne geophysical surveys, eliminates the need for manipulation of the airborne receiver while in flight and the attendant risk of lane error; it also considerably increases the service-area of low-power transmitting stations under the radio noise-level condition encountered in the tropics.

THE DECCA NAVIGATOR

Mobile Chains for Exploration and Survey

** Details of the "Repeater Unit" and other Decca Navigator survey equipment from*

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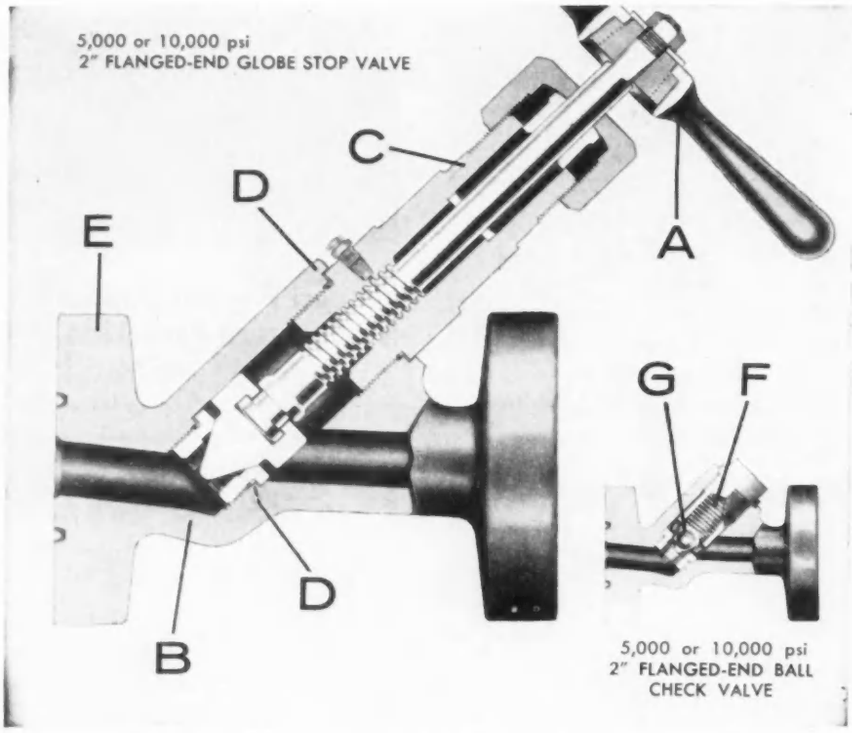


New Edward High-pressure Valves for Petroleum Services

New high-pressure, *flanged-end* valves from Edward are designed to give you longer, more dependable service for many petroleum industry applications requiring highest quality in forged steel valves: high pressure heaters, treaters and separators, high-pressure vessel blow-down; headers and flow lines; bypass lines; unloading in compressor stations; blow-out preventer manifolds; throttling services; and many other similar petroleum industry applications.

NEW GLOBE STOP VALVES—There are two new Edward flanged-end, globe stop valves: one for pressures to 5,000 lb WOG at 300F (10,000 psi test); and one for pressure to 10,000 lb WOG at 300F (15,000 psi test). Both valves have the exclusive cross-arm style Impactor handle* (A) that makes closing against high pressure much easier, eliminates need for "cheaters." Valve body (B) is drop forged of chromium-molybdenum alloy steel to exacting requirements for maximum ruggedness and long life under toughest service conditions. The inclined bonnet (C) facilitates streamlining of flow passages, reduces pressure drop and wear-producing turbulence. Metal gaskets (D) and buna-N "O" rings assure tight, leak-proof fit between body and bonnet and between seat and body. Flanges (E) are forged integral with body and faced according to A.P.I. Standard 6B.

NEW BALL CHECK VALVES—In the same pressure classes as the new stop valves, are two new forged-steel, ball check valves. These new check valves have the same general construction plus stainless steel spring (F) and 16% chromium stainless steel ball disk (G) for tight seating. Seat and ball disk are replaceable.

To get the complete story, plus ratings and dimensions, on new Edward flanged-end valves, write for Bulletin 584. Edward builds a complete line of cast and forged steel valves for pressures to 10,000 lbs, with flanged, screwed, socket, or butt welding ends. For additional information, see your favorite distributor, or write Edward Valves, Inc., 1214 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company. *T.M. Reg. U.S. Pat. Off.

New globe stop valve Figs. 5158 and 9158

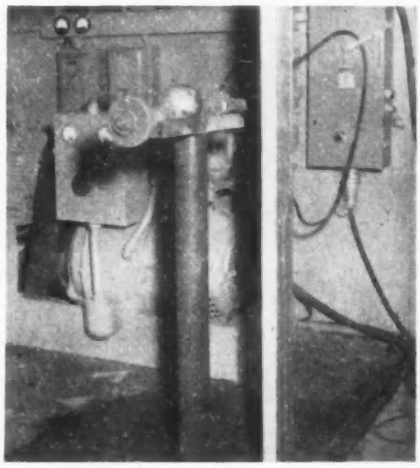
New ball check valve Figs. 5160 and 9160

EDWARD STEEL VALVES
another fine product by
ROCKWELL

any position is saving rigging-up time for one drilling contractor.

Shown in the photograph, the channel iron-constructed unit is hinged to a vertical member of the substructure and can be swung in to remain flush with the unit when the rig is moved. The yoke support is provided with a further vertical adjustment, a threaded unit that permits raising or lowering through several inches.

This hinged support, besides being a sturdier and more stable device, eliminates the need for a separate A-type support resting on the ground, the latter being subject to settling and being just one more piece of equipment that has to be picked up and moved between locations.



Convert Portable Grinder Into Stationary Bench Unit

A portable hand grinder can be easily converted to a stationary bench unit by fabricating a single work stand of the type devised by a crewman of one drilling contractor.

A short piece of channel iron of a size that comfortably "cradles" the grinder was welded to a short drill pipe post, the latter in turn being welded to the steel floor of the generator house. A light steel strap, partially encircling the neck of the grinder between the wheel and motor, bolts to the channel iron base to hold the unit firmly in place. The grinder is placed in such a way that the switch always will be handy to the operator.

Such an installation will provide a permanent grinder for a large percentage of small jobs normally occurring on the location, yet provides the highly desired flexibility of a portable unit when necessary.

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Fuel Tank Made Lighter By Reducing Skid Size

One contractor found a way to reduce the weight of the fuel tank by reducing the size of the skid on which the tank was mounted. However, with the reduction in skid size, it was necessary to provide reinforcing for the weld holding the tank to the skid.

This was done by welding short pieces of rod to the skid and to the side of the tank. The fuel tank is now safely mounted on the skid and the unit is much lighter.

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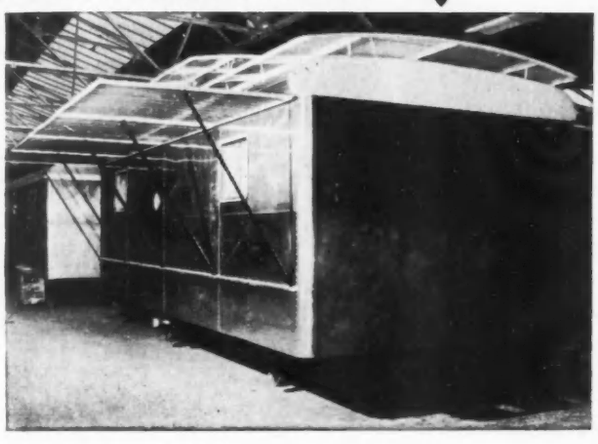
Interior of a 10′ x 30′ mobile Mess-unit built by Reall for Esso Standard (Libya) Inc.

INSIDE . . . AND . . . OUT



Typical air-conditioned four-berth cabin units built for Esso Standard (Libya) Incorporated by Reall of England

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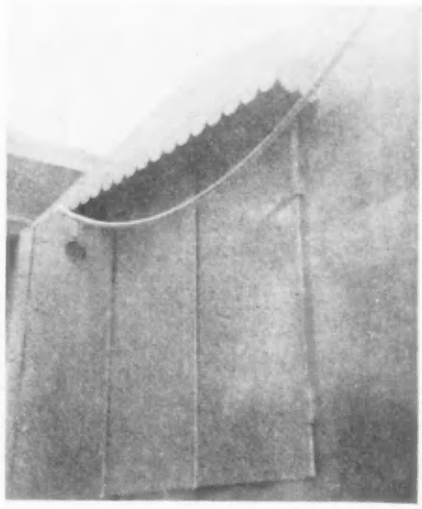
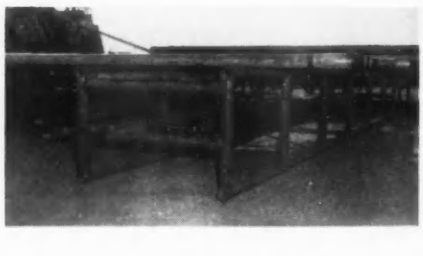


Attractive Awnings Keep Rain Out of Doghouse

The illustrated awning was seen on a doghouse located in the Gulf Coast. Not only does it add to the attractiveness of the doghouse, but it also serves to keep out rain when the windows are open.

It is constructed from four pieces of sheet metal welded together. It is fitted over the windows and welded in place. The edge has been scalloped to make it more attractive.



Materials Stacked Neatly Means Extra Storage Rack

Considerable extra storage space for lumber, line pipe and other miscellaneous tubular goods can be gained at little extra fabricating cost by building a second level in rectangular pipe rack sections.

As shown in the photograph, materials stored in this manner are easily inventoried and are readily accessible when needed. Keeping such materials off the ground not only makes for better housekeeping around the rig site, but saves costs in preventing damage caused by vehicles running over them; eliminating needless cleaning of threads; and avoiding loss of time spent in looking for a particular item outside of the immediate rig area.

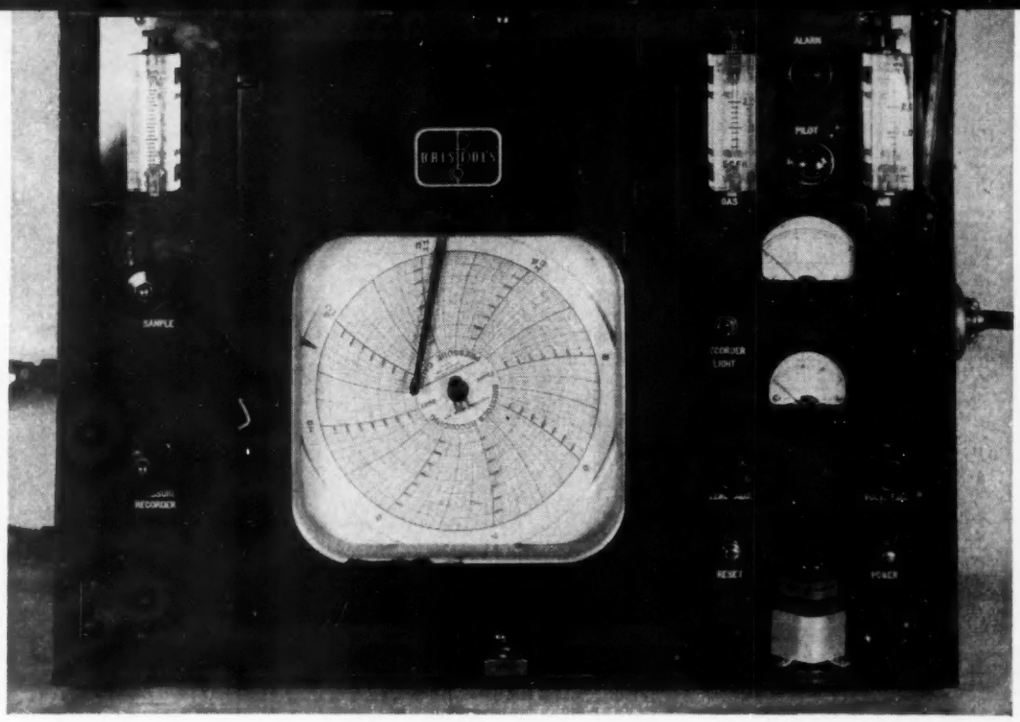


FIGURE 1—This recording indicator constantly records surface pressure while the test string is filled with nitrogen and throughout the flowing period of the test. The device also is equipped with a combustible gas indicator which sounds a warning bell when formation gas first reaches the surface.

New DST technique yields better formation samples

Nitrogen blanket used in lieu of water cushion prevents contamination of recovered formation fluids. Precise control, reduced rig time are additional features

By Arthur W. Smith, Vice President and General Manager
Cook Testing Company, Odessa, Texas

THE USE OF nitrogen under pressure instead of the conventional water cushion normally used in drill stem testing operations has provided excellent results for operators in the West Texas area. When used in conjunction with a control valve that may be positioned at any point in the testing string, any specific length of drill pipe or tubing may be pressured with nitrogen to any desired value prior to the test. Chief advantages of the technique are.

• Better formation samples are obtained. Formation fluids are not contaminated or diluted with cushion water. There is no question as to where recovered water originated and no question as to the quantity produced on the test. Oil is recovered in one body rather than being scattered through a long column of cushion water.

• Less rig time required. For example, one typical job required that 2,000 feet of the test string be protected. A nitrogen blanket pressured to 430 psi was applied to the section in three minutes. Equivalent time required to fill the section with water was estimated at from one to two hours.

• Nitrogen is versatile and safe. The entire length of the testing string pressured with nitrogen is subjected to the same pressure over its entire length. Surface equipment is easily tested.

Compressed nitrogen first was introduced to the oil industry some four years ago in California. Its primary use was to minimize plugging action and anchor sticking during drill stem testing of unconsolidated and soft formations. Since its introduction, many

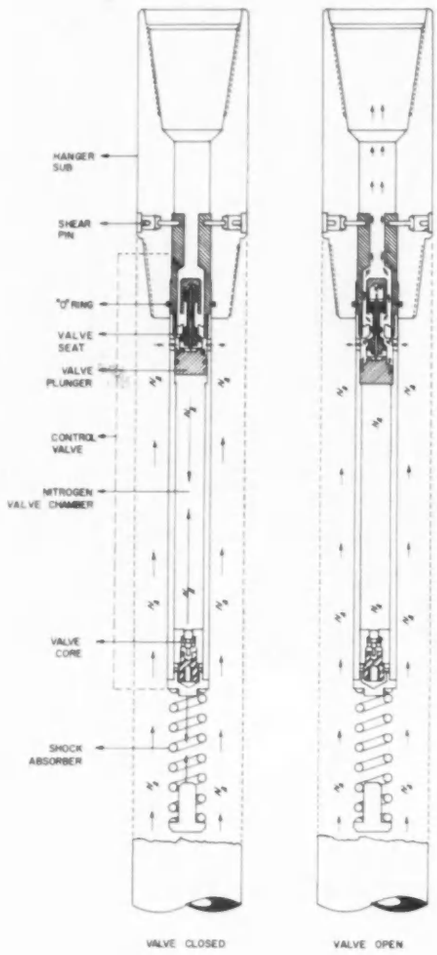


FIGURE 2—These drawings show the nitrogen control valve in both the closed and open position. As shown at left the valve is closed, pressured up, loaded and secured in the hanger sub with shear pins and is ready to run. Nitrogen then is injected into the test string through the filler sub (Figure 3). The filler sub may be run immediately below or one joint below the hanger sub. When the N_2 pressure in the test string below the control valve exceeds the preset pressure of the control valve chamber by 10 to 20 psi, the valve will open and exhaust excess N_2 indicating the test string has been pressured to the desired value. After pressure in the test string declines to the preset pressure of the control valve, the valve automatically closes.

FIGURE 3—Here the hanger sub with the nitrogen control valve in place is in position to be screwed into the nitrogen filler sub. Nitrogen is introduced into the drill pipe or tubing through the port of the filler sub as indicated.

new uses have been developed for nitrogen in the petroleum industry.

Nitrogen is a valuable aid in drill stem testing, whether or not the well depth is such that protection is required for the drill stem from excessive hydrostatic mud pressure. When well depths and mud weights are such that the drill stem near the bottom of the hole is not in danger of collapse, it is practical to pressure the entire drill string (from surface) with nitrogen before the packer is set or the bottom hole testing valve is opened. This automatically tests surface equipment for leaks before the tool is opened. When the packer is set and the tool is opened, the nitrogen pressure in the drill string prevents a sudden release of pressure at the face of the formation. This tends to reduce sloughing of the formation and aids in obtaining a packer seat by avoiding a sudden differential across the packer equivalent to the hydrostatic mud pressure.

The surface valve is not opened until several minutes after the bottom hole testing valve is opened. This permits the engineer in charge to determine if the formation pressure is greater than the nitrogen pressure, and to observe the length of time required to obtain maximum pressure. A surface pressure gage and recording indicator (Figure 1) provide a permanent record of surface pressures. The indicator also is equipped with a combustible gas indicator to sound a warning bell when formation gas first reaches the surface. The nitrogen may be slowly bled off as desired. This gradually increases differential pressure across the packer rather than subjecting it to a sudden shock, thus avoiding possible packer failure.

This same procedure has been effective in minimizing difficulty caused by plugging action of lost circulaton material when large amounts of this material are present in the drilling fluid. In a recent test (Figure 4) this procedure collected 110 feet of lost circulation material, cut 60 percent oil, in the pipe. The gentle lifting of the blanket permitted this recovery. The shock of opening the test tool would almost certainly have plugged the tester without the back pressure provided by the nitrogen. The use of a nitrogen blanket has, in effect, changed the flow bean of the test from the bottom of the hole to surface where it can be controlled positively at the discretion of the engineer in charge. The process also has permitted

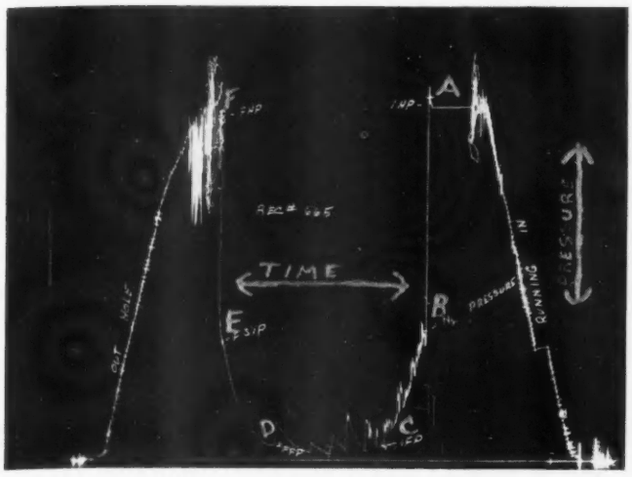


FIGURE 4—This pressure chart (at left) indicates the value of a N_2 blanket when testing wells drilled with a high percentage of lost circulation material in the drilling fluid. Since the back pressure exerted by the N_2 was under complete control at all times, the operator was able to recover 110 feet of lost circulation material in the drill pipe cut with 60 percent oil. If a conventional water blanket had been used, the tool would probably have plugged.

A. Initial mud pressure in hole. Pressuring up entire string of drill pipe before opening tester.
B. Back pressure from surface with nitrogen.
B. to C. Bleeding nitrogen off on small choke at the surface.
C. to D. Tester open to atmospheric pressure with no back pressure.
D. to E. 30 minutes final shut-in pressure.
F. Final mud pressure out of hole.

FIGURE 5—This chart (at right) was taken from a test where nitrogen back pressure was greater than formation flowing pressure.

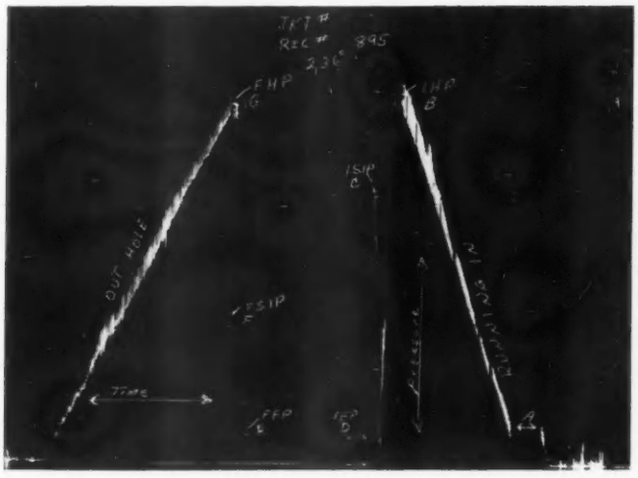
A. Pressuring up on 2,400 feet of drill pipe using the control valve.
B. Initial hydrostatic mud pressure.
C. Initial shut-in pressure.
D. Initial flow pressure.
E. Final flow pressure.
F. Final shut-in pressure.
G. Final hydrostatic mud pressure.
H. Bleeding nitrogen off at surface.

Recovered 130 feet gas cut mud. Control valve preset with 450 psi nitrogen with 400 psi nitrogen on drill pipe for protection.

FIGURE 6—(at left) This chart is from a DST where 1,000 feet of water cushion was used for pipe protection.

A. Time required to inject water cushion in drill pipe.
B. Initial hydrostatic mud pressure.
C. 15 minute initial shut-in.
D. to E. Tool open.
E. to F. 15 minute final shut-in.
G. Final hydrostatic mud pressure.

Total depth 12,560 feet, recovered 50 feet free oil, 60 feet oil and gas cut mud, 40 feet water cushion cut mud and 1,010 feet oil and gas cut water cushion.



successful tests in areas where it previously has been impossible to get a test due to formation characteristics.

Collapse protection. When well depth and mud density are such that protection from collapse is required over the bottom portion of the drill string, a nitrogen blanket may be run by using a nitrogen control valve. (Figures 2 and 3). This valve is a recent innovation used in drill stem testing with nitrogen. It is a special tool which permits pressuring any desired length of the bottom portion of the drill string to any pressure necessary for protection from collapse or for formation control. The valve is installed in a special shear pin sub and can be run at any depth in the string. The shear pin feature of the sub provides a method for removal of the valve should it become necessary to run tools inside the drill pipe below the sub while it is in the hole. To remove the valve, it is only necessary to pump fluid into the drill pipe from the surface. Rig pump pressure is sufficient to shear the pins holding the valve in the sub. After the pins are sheared, the valve may be pumped to bottom, leaving full drill pipe diameter through the sub. This is a valuable safety feature to permit running free point indicators, stringshots, etc., should the pipe become stuck during testing operations.

Operation of the valve is similar to that of a gas charged gas lift valve. For example, if the equivalent of 2,000 feet of water is required to protect the drill pipe from collapse, the valve (Figure 2) is pre-set at the surface with nitrogen to the pressure equivalent to 2,000 feet of water. (Approximately 460 psi). The valve is installed in the hanger sub (Figures 2 and 3) and the sub is installed in the drill string after the test tool and 2,000 feet of drill pipe have been run in the hole. The sub has a side port

FIGURE 7—Nitrogen is transported to location in the type of truck shown here. This type of unit has passed the I.C.C. Bureau of Standards and Acme test and is registered with the Federal Bureau of Explosives.

valve below the control valve for entry of nitrogen. A high pressure hose is connected to the entry port from a nitrogen transport truck (Figure 7). Nitrogen is delivered from the truck to the drill pipe until the control valve opens and pops nitrogen to the atmosphere. (The time required to fill 4,000 feet of drill pipe consumes only approximately 12 minutes of rig time. This is much less time than would be required to fill the same length of drill pipe with water). The drill string then is run to bottom as in any other drill stem test.

Testing. After reaching bottom, the initial shut-in pressure may be taken if desired. When the tool is to be opened for the test, the drill string is rotated at the surface the required number of rounds to open the testing tool. This exposes the formation pressure to the nitrogen charged portion of the drill pipe. If the flowing formation pressure is 10 to 20 psi greater than the nitrogen back pressure, the nitrogen control valve will open automatically, giving a surface indication that fluid is entering the drill string from below the packer. If the formaton is tight and so low in permeability that it does not give up enough formation fluid to increase the pressure in the nitrogen chamber sufficiently to open the control valve, the nitrogen will be compressed enough to permit recovery of enough uncontaminated formation fluid to analyze (Figure 5). This, along with the pressure recorder readings, leaves no doubt as to the nature of the formation fluid.

The nitrogen cushion is of particular value if the fluid recovered in such instances is water. When a water cushion is used it is often impossible to detect a small recovery of formation water. When nitrogen is used, there is no question as to whether water obtained on the test came from the formation or not, and no question as to the quantity of water produced. Also, there is no dilution of produced water by cushion water. Oil is recovered in one body rather than being scattered through a long column of cushion water (Figure 6).

If the zone tested is a high pressure gas zone, the control valve automatically retains the pre-set back pressure on the portion of drill pipe it is desired to protect from collapse. When a water cushion is used on a high pressure gas test, the water cushion is sprayed out at the surface, leaving the pipe empty and subject to collapse when the testing tool is closed and the pressure is bled off at the surface.

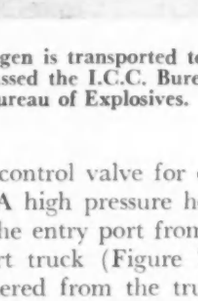
Nitrogen also is more versatile than water. Any portion of the drill string may be protected with any pressure desired. For example, assume 1,000 feet of drill collars are used on bottom and 1,000 feet of drill pipe above the collars require protection. With water, a minimum of 2,000 feet would be required, which would exert a pressure of 860 psi on the formation when the tool is opened. With nitrogen, only 430 psi would be required to protect the drill pipe. Furthermore, this procedure gives the full 1,000 feet of drill pipe the benefit of 430 psi protection. Protection given by water varies from 430 psi at the bottom of the drill pipe to zero psi at the top of the 1,000 feet protected, and gives the greatest protection, from 430 to 860 psi, in the drill collars where it is not required. This versatility would be of particular value should a low pressure zone be tested with considerably strong pipe, such as drill collars, on bottom, with a weaker section of pipe higher up in the string.

Now that nitrogen is available in the field other practical uses have been found for it. It has been found to be useful in displacing fluids in wells that have become loaded with water, or that would, for other reasons, normally require swabbing to restore to production. If well depth and characteristics are suitable, such wells may be restored to production simply by displacing the fluid from the well with nitrogen.

Nitrogen has also been used to displace fluid from the annulus at the surface of gas injection wells for safety reasons. Since nitrogen is compressible and liquids are not, a nitrogen blanket over the fluid in the annulus of a gas injection well will provide a buffer against shock should the tubing rupture. Because nitrogen

Continued on Page 187

About the Author



Arthur W. Smith has been associated with the oil industry in various phases for the past 23 years. For 15 years he worked in the production and drilling businesses in Louisiana and Texas. He has devoted the last eight years to drill stem testing and has served as general manager of Cook Testing Co.'s Permian Basin Area since January of 1956. The first Cook Nitrogen plant was completed in Odessa, Texas, in April of 1957. Added to his duties as general manager of the testing operation was the responsibility of introducing nitrogen to the petroleum industry in this area. Smith has been constantly on the lookout for new and improved uses of this inert gas and is the inventor of the nitrogen control valve.

Rubber sleeve core barrel increases recovery

Unconsolidated sand formations are retained in an undisturbed condition with the individual grains remaining in their original orientation

By Ben L. Austin
Research Engineer
Christensen Diamond Products Co., Salt Lake City

THE NEED FOR obtaining reliable reservoir information in many areas has led to the development of a rubber sleeve core barrel. This new tool is being used widely in areas heretofore considered not adaptable to conventional coring techniques.

Features of the barrel. The most outstanding feature of the rubber sleeve barrel, as the name implies, is that a tight fitting rubber sleeve encases the core as it is formed, thereby performing a number of important functions:

- The rubber sleeve which is pulled into the core barrel at the same rate that the core is formed acts as a cylindrical conveyor, supporting the weight of the core and transporting it into the barrel. Since this sleeve is 2⅜-inch I.D. in its free state and is stretched over a 3-inch core, a substantial force similar to the overburden pressure is exerted on the core tending to keep it in its original state.
- Fractured and unconsolidated sections of formations which tend to swell or decompose when in contact with the well fluids are, therefore, contained so they will not bridge in the inner barrel and cause the core to be ground up.
- This compacting force also retains most unconsolidated sand formations in an undisturbed condition with the individual grains remaining in their original orentaton.

The rubber sleeve principle will not provide a theoretically "uncontaminated core" since invasion of the reservoir by well fluids may be an instantaneous phenomenon, occurring even before the core is formed. However, packaging of the core immediately after it is cut and isolating it from moving fluids as it is forming tends to retain the core in the "as-cut" state with much less contamination than is possible otherwise. It also minimizes the deleterious effects that may occur as a result of prolonged submersion of the core in the well fluids.

An interesting example of this occurred recently in eastern Venezuela where the rubber sleeve barrel was used to core a section originally described as a "soft-to-mushy" unconsolidated sand. When the cores were recovered, they were found to be well compacted, almost firm. Yet, when re-

Cross-Sectional View of the Rubber Barrel in a Sequence of Operational Stages

FIGURE 1—Position going in the hole.
FIGURE 2—Position just prior to coring.
FIGURE 3—Position following coring of a two-foot interval

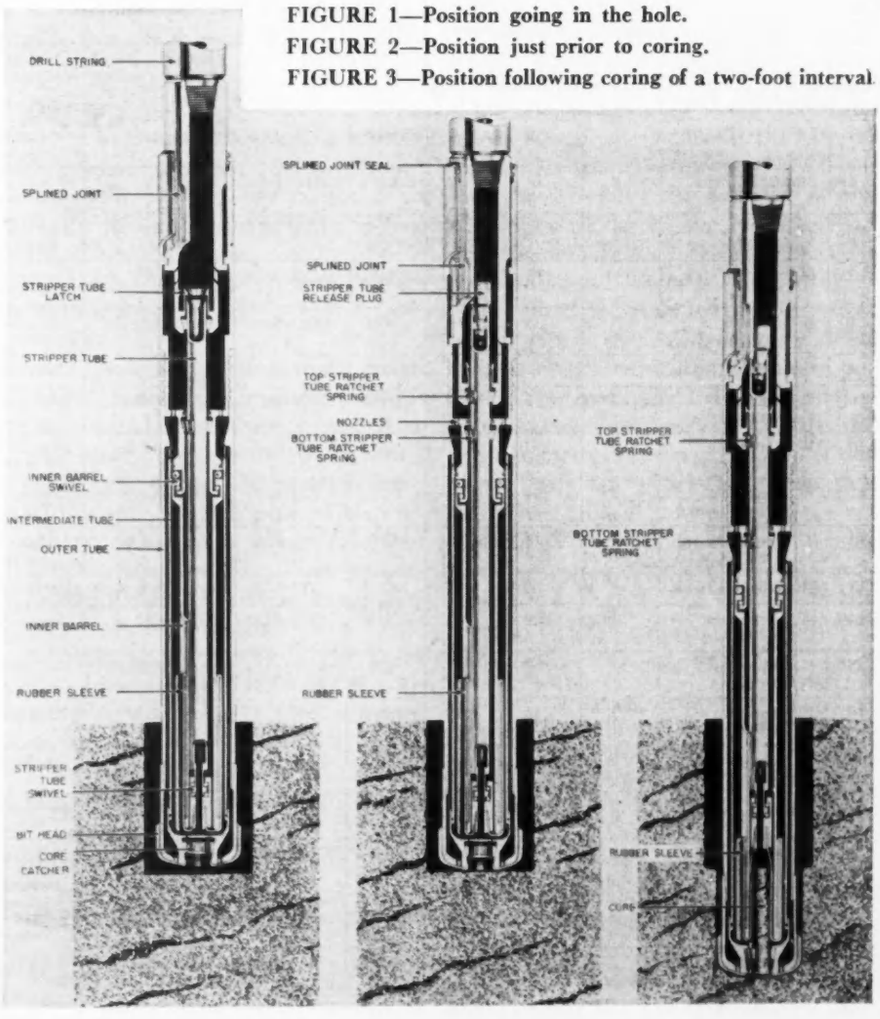


FIGURE 1 FIGURE 2 FIGURE 3

The weight on the bit is provided by the pressure drop developed at the nozzle acting across the area of the splined joint seal . . .

moved from the rubber sleeve and submerged in mud, these cores decomposed rapidly. It is easy to understand how the rubber sleeve barrel improves the quality and recovery percentages of cores.

Operation of the barrel. Although the rubber sleeve coring technique is more complex than conventional coring methods, its operation in the hole is trouble-free. When the barrel is being run into the hole (Figure 1), it is possible to apply weight, rotate and circulate as is occasionally necessary to wash out bridges and work through tight spots. Once bottom has been reached and circulation established, the stripper tube release plug is dropped into the drill pipe and circulated to its seat in the top of the stripper tube. When the release plug is seated properly, as shown by an increase in circulation pressure, the fingers of the stripper tube latch are spread open, allowing the splined joint to be collapsed its full stroke of two feet (Figure 2). At this time, the brake on the drawworks is tied down while the splined joint extends and the first two feet of core are cut.

Weight on the bit is provided by the pressure drop developed at the nozzles acting across the area of the splined joint seal, while the torque is transmitted by the splined joint. As the bit head penetrates the formation and the splined joint starts to extend, the stripper tube is prevented from moving downward by the top stripper tube ratchet spring. Consequently, the rubber sleeve, which is attached to the lower end of the stripper tube, is pulled into the lower inner barrel as the bit head and core barrel advance downward over the core. The stripper tube in this manner might be said to pull the rubber and core into the core barrel.

When two feet of core have been cut as shown in Figure 3, an increase in indicated weight on the hook plus a loss of rotary torque is observed. Rotation and circulation then are stopped, and the drill pipe is lowered another two feet. While this is happening, the top stripper tube ratchet spring is carried down over the strip-

TABLE 1—Field Results of Numerous Operations While Using the Rubber Sleeve Core Barrel

Job No.	Location	No. of Cores	Total Feet Cored	Total Recov.	% Recov.	Depth Interval	Formation Cored	Comparative Results
1	Harrison Co. Texas	1	12	11	92%	2390–2402	Broken Lime	Cores satisfactorily w/standard diamond barrel.
2	Lincoln Co. Miss.	1	14	12	86%	10800–10814	Shale	Cores satisfactorily w/standard diamond barrel.
3	Lafayette Co., Ark.	1	10	10	100%	2794–2804	Soft Sand	Several extremely soft layers 1 to 3 inches thick recovered. Std. bbl. would recover everything except these soft sections.
4	Smith Co. Miss.	1	19	12	63%	4800–4819	Shale	Would core satisfactorily with std. barrel. Coring here to obtain un-contaminated shale cores for study by Mud Co.
5	Sterling Co. Texas	16	153	144	94%	1724–1877	Anahydr. Sd., Sh.	Much of this section would core satisfactorily with std. bbl. but recovery would be low in soft sand sections.
6	Murray Co. Okla.	1	16	15	94⅜	4325–4341	Soft Sand	Coring with std. diamond barrel in this area was discontinued because of poor recovery.
7	Beauregard Parrish La.	2	38	34	89%	6227–6350	Sand & Shale	Anticipated very soft sands but this could have been cored with conventional barrel.
8	Hardin Co. Texas	4	72	66	92%	8534–8828	Sand & Shale	Recovery fair to good with standard diamond barrel.
9	E. Venezuela (Jusepin)	19	414	340	82%	3638–4469	Sand & Shale	Recovery poor with standard diamond barrel.
10	W. Venezuela (Mene Grande)	10	110	106	96%	584–694	Tar sand & Clay	Almost impossible to recover anything but clay in this formation. Tar sand completely unconsolidated.
11	W. Venezuela (Mene Grande)	7	124	108	87%	543–667	Tar sand & Clay	Almost impossible to recover anything but clay in this formation. Tar sand completely unconsolidated.
12	W. Venezuela (Mene Grande)	7	126	117	93%	575–701	Tar sand & Clay	Almost impossible to recover anything but clay in this formation. Tar sand completely unconsolidated.
13	Duvalle Co. Texas	4	78	69	88%	2410–2535	Soft Sd. & Shale	Previously unable to recover with standard barrel.
14	W. Venezuela (Lake Maracaibo)	13	224	119	53%	2160–2433	Soft Sand	Lost most of core from rubber coming out of hole. Poor recovery but much better than any previous experience.
15	E. Venezuela (Jusepin)	16	317	261	82%	4027–4471	Sand & Shale	Recovery poor with standard diamond barrel.
16	E. Venezuela (Melones)	2	40	35	86%	3600	Soft Sd. & Shale	Previous recovery average 13%.
17	E. Venezuela (Meray)	9	160	137	86%	3625–4014	Soft Sd. & Shale	Previous recovery average 13%.
18	Hardin Co., Texas	2	40	36	90%	8680–8720	Firm Sd. & Shale	Recovery fair to good w/standard diamond barrel.
19	Orange Co. Calif.	12	210	±50	±25%	325–600	Unconsolidated Conglom.	Most recovery ever obtained here. No recovery with several other types of barrels. Boulders from 12′ dia. to pea gravel w/soft sand and tar between. Core would not form.
20	Murray Co. Okla.	3	36	36	100%	4300–4350	Firm Sd. & Shale	Coring with std. diamond barrel in this area was discontinued because of poor recovery.
21	Placquemines Co., La.	2	39	31	79%	8458–8497	Soft Sd. & Shale	Saltwater injection well—maximum quality cores required.
	TOTALS	..	2198	1736	79%	.....	.....	

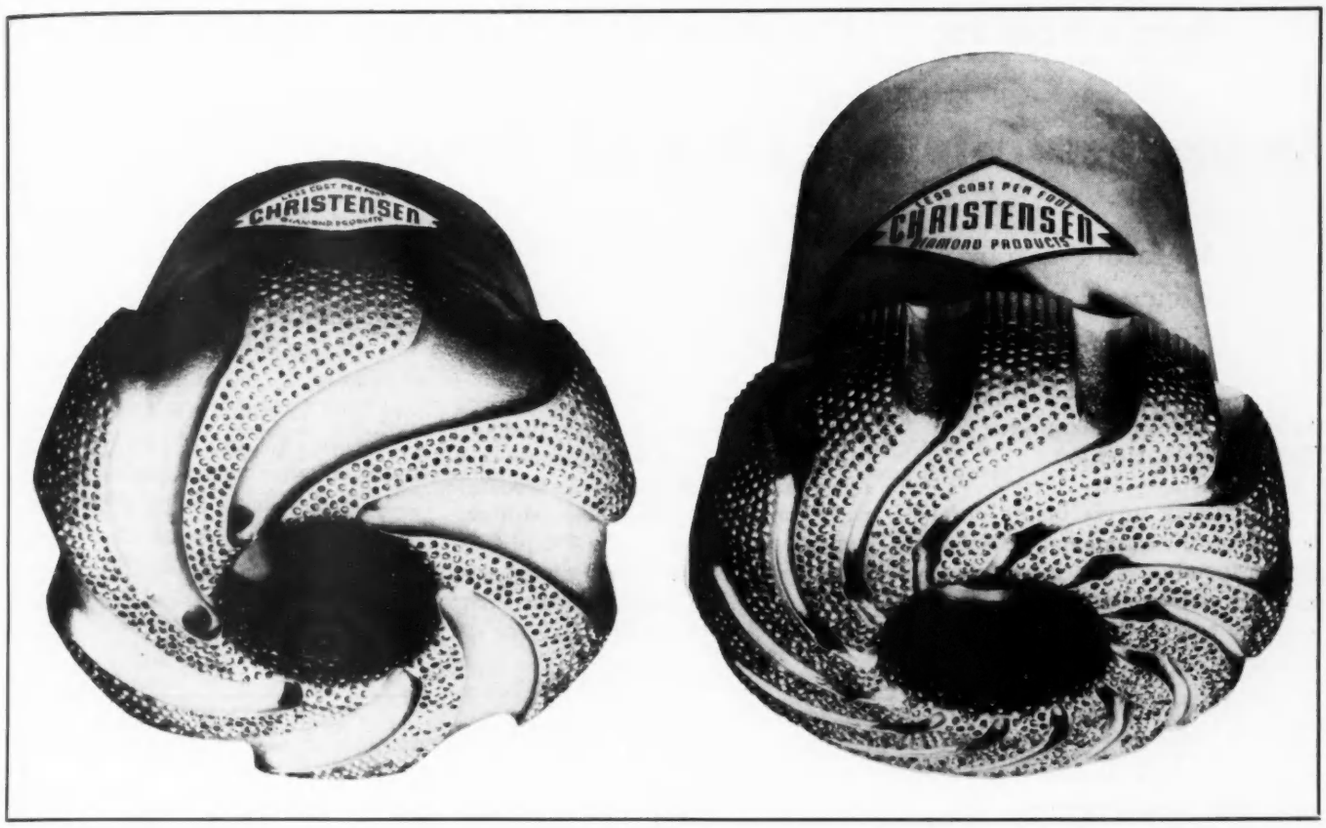


FIGURE 4—Two new types of core heads that are being used in conjunction with the rubber sleeve core barrel.

per tube with the male half of the splined joint. The bottom stripper tube ratchet now catches the stripper tube and prevents it from moving downward and disturbing the core. In this manner the stripper tube is held stationary in elevation all during the time the core is being cut, and the rubber sleeve, once it has been pulled off the inner barrel, remains stationary with respect to the core that it surrounds.

Field applications. The field use of the rubber sleeve barrel has been limited generally to areas where unconsolidated formations have made recovery with conventional coring methods difficult. As shown in Table 1, eastern and western Venezuela, Louisiana, South Texas, East Texas, West Texas, Oklahoma, Mississippi and Arkansas have been areas where these barrels have been used recently. In most of these applications it has been possible to obtain recovery in the range of 90 percent. Several of these wells could have been cored satisfactorily with a conventional core barrel, and high recoveries would have been anticipated, while others were problem applications.

The majority of the core lost on these jobs resulted from the rubber sleeve being damaged and parting or, as on job No. 14, the core was so soft it would not remain in the rubber during the trip out of the hole. Work is continuing in an effort to eliminate both of these problems.

Bits. Use of diamond set core heads in these extremely soft and unconsolidated sands has not been regarded as a necessity in the past. However, when the original rubber sleeve barrels were run, this was the only type of bit that was considered. It soon was found in the field, however, that these unconsolidated sections were seldom massive bodies that did not contain at least occasional shale breaks. The need arose almost immediately for a core head that would meet the following specifications:

- Rapid penetration in soft sections
- Ability to penetrate firm to hard sections
- Adequate fluid control to avoid washing of soft sands
- Ability to penetrate with light loads
- Low cost per foot.

Diamond set bits presently in use with the barrel (Figure 4) have met these requirements. Diamond bits retain their shape throughout their life and have led to the solution of the fluid control problem. Penetration rate in both soft and hard formations has been good. Two-foot sections have been cored in from two to three seconds, while the harder shales occasionally required up to 40 minutes per foot. The hydraulic feed joint in the core barrel has contributed to the good penetration rates since it is automatically fed off at the proper rate and maintains a constant weight on the bit. Footage has been high and the final cost per foot has been favorable.

The rubber sleeve core barrel is available in 6⅞-inch O.D., recovering a 3-inch diameter core, 20 feet long; however, the majority of the work has been done with 7½-inch O.D. bits, although 8⅜-inch bits have been used on occasion.

This article was condensed from a paper "Rubber Sleeve Core Barrel Improves Recovery in Unconsolidated Formations" presented before the API Mid-Continent District Divisions of Production, Amarillo, Texas, April 23-24, 1959. **—The End**

Here's how to . . .

Improve your gas lift installations

Operators can save money, increase installation efficiency by proper application of data obtained from down-hole pressure and temperature surveys

By H. W. Winkler, Engineer
CAMCO, Inc., Houston

A PRESSURE survey before installation of gas lift equipment represents a small expenditure which can save an operator many dollars. Savings may be in initial equipment or higher operating efficiency from a properly designed installation or both. The pressure element range employed for a survey always should be compatible with the pressure to be measured (A 0 to 6000 psig range element should not be used to measure 300 psig). A fast chart drive clock should be used in the bomb for temperature and pressure surveys for detailed analysis of gas lift operation. (A six-hour drive chart was used to obtain the surveys shown in Figure 3, and a three-hour clock was used to obtain the surveys shown in Figure 7). Certain precautions are required when running a survey in a gas lift well being produced by intermittent lift. The use of the temperature survey for quantitative work in gas lift wells is overlooked by many operators.

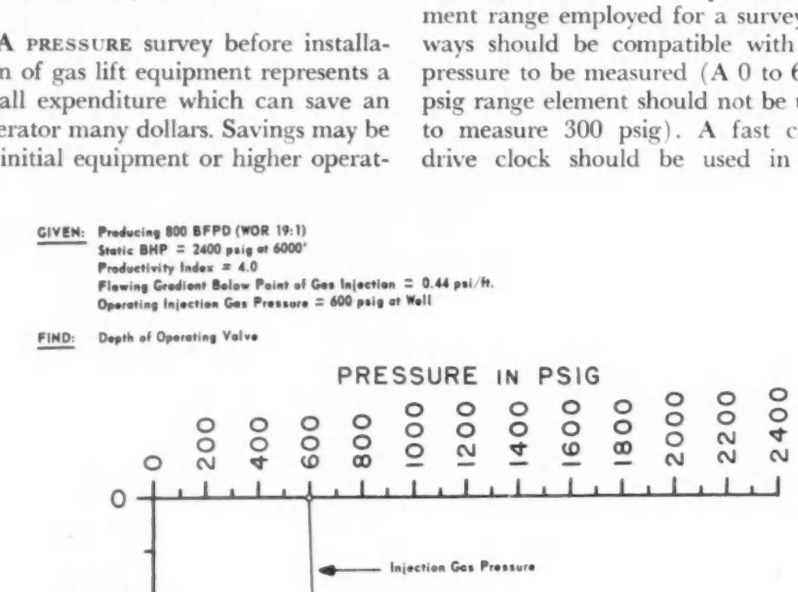

GIVEN: Producing 800 BFPD (WOR 19:1)
Static BHP = 2400 psig at 6000'
Productivity Index = 4.0
Flowing Gradient Below Point of Gas Injection = 0.44 psi/ft.
Operating Injection Gas Pressure = 600 psig at Well
FIND: Depth of Operating Valve
PRESSURE IN PSIG
0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400
DEPTH IN FEET
0 1000 2000 3000 4000 5000 6000
Injection Gas Pressure
30 psi
Operating Valve Depth = 2350' for Differential Pressure Across Valve = 30 psi
880 psig at 3000'
640 psig at 3000'
Flowing Gradient = 0.44 psi/ft. from Pressure Survey
Flowing BHP = 2200 psig
Static BHP = 2400 psig
CALCULATIONS:
Drawdown = BFPD / P.I. = 800 / 4 = 200 psi
Flowing BHP = Static BHP − Drawdown = 2400 − 200 = 2200 psig
Establish Flowing Gradient Curve:
Pressure at 3000' = 2200 psig − (6000' − 3000') 0.44 psi/ft.
= 2200 − 1320 = 880 psig at 3000'
Establish Injection Gas Pressure Curve from Appropriate Gas Weight Curves:
600 psig at Surface = 640 psig at 3000'

FIGURE 1—The procedure illustrated here for locating operating gas-lift valves is used widely in the Texas-Louisiana Gulf Coast area where reservoir pressure does not change appreciably with time. The point of gas injection determined by this method used with accurate pressure data results in minimum gas requirements.

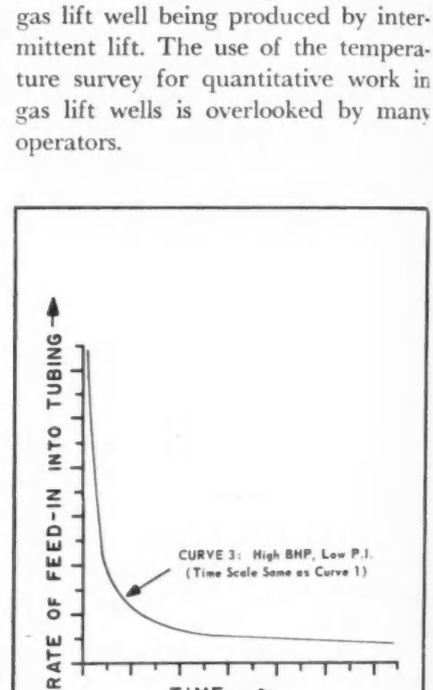
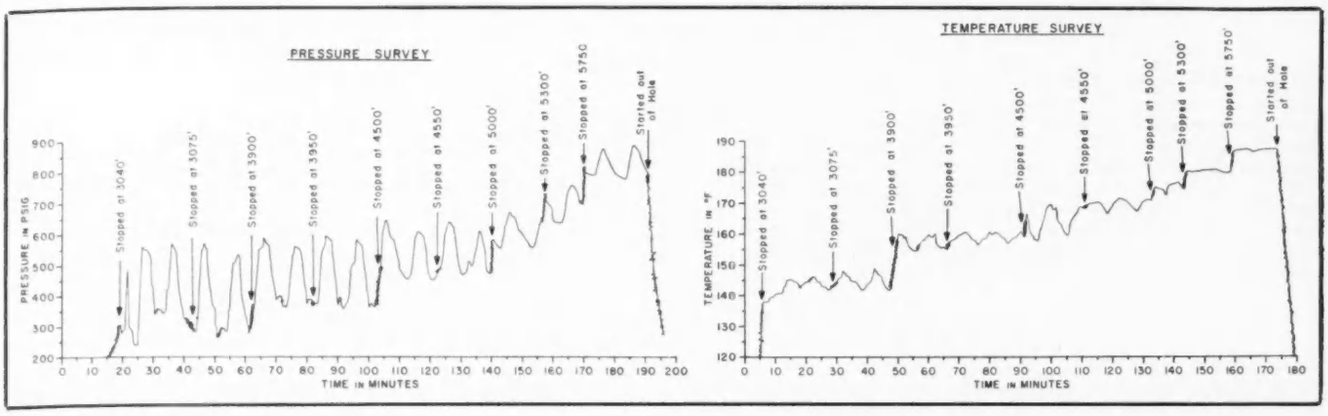

RATE OF FEED-IN INTO TUBING
TIME
CURVE 3: High BHP, Low P.I.
(Time Scale Same as Curve 1)
BOTTOM HOLE PRESSURE
TIME
CURVE 1: High BHP, Low P.I.
CURVE 2: Low BHP, High P.I.

FIGURE 2—Here are two hypothetical pressure build-up curves and a rate of feed-in curve for two types of intermitting wells. Such curves are useful for properly designing an intermittent gas lift installation and determining proper injection gas frequency for maximum production.



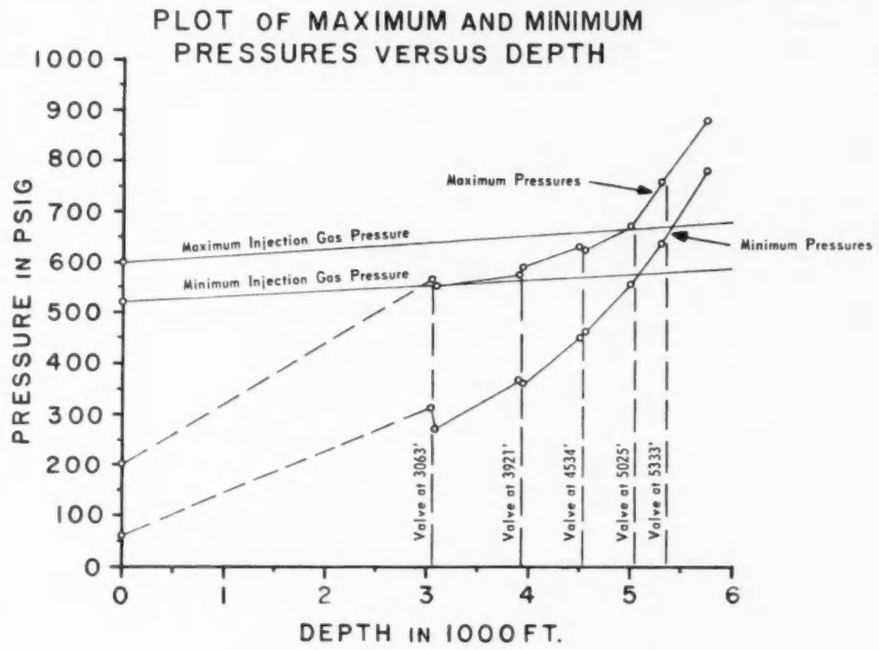
FIGURES 3 and 4—Pressure and temperature surveys conducted in the same well on the same day are shown in Figure 3. The surface controller on the injection gas line was open for 2½ minutes once every 10 minutes (144 injection gas cycles per day). The curves in Figure 3 represent nearly 400 readings and are included to illustrate the appearance of bomb charts obtained from these surveys. For interpretive purposes, only the maximum and minimum values recorded at each depth are needed, as shown in Figure 4. It is difficult to determine the operating valve from the pressure survey in Figure 4. The operating valve is obvious in the temperature survey. Although a small volume of gas was entering the gas lift valve at 5,025 feet, the valve at 4,534 feet was the operating valve. The pressure survey indicated the operating valve to be at 5,025 feet which was not true since most of the gas was entering the tubing at 4,535 feet.

PRESSURE SURVEY PRIOR TO GAS LIFT INSTALLATION

Importance of static fluid level. A reliable static fluid level can be obtained from a pressure survey. Spacing the top gas lift valve at the static fluid level can save an operator several thousand dollars in a low bottom hole pressure, deep well. Such savings can be illustrated by an actual example.

An operator ordered wire line retrievable gas lift equipment for a 13,000 foot well in West Texas. The operator specified that the top valve be spaced at a depth of approximately 1500 feet, based on injection gas pressure. The well was believed to have a high bottom hole pressure and fair productivity index. After valves were installed, the well was unloaded and operated unsatisfactorily.

Various injection gas frequencies were tried without success and a B.H.P. survey finally was conducted. The point of gas injection was found to be at a depth of nearly 10,000 feet, which had been suspected because of the low operating injection gas pressure. Static fluid level was below 6,000 feet. Five mandrels, retrievable valves and latches had been run above the fluid level. This equipment alone represented an investment of nearly $3,000. The top five gas lift valves were pulled with wire line tools and replaced with dummy blanking valves. The lower gas lift valves also were pulled and replaced with higher pres-



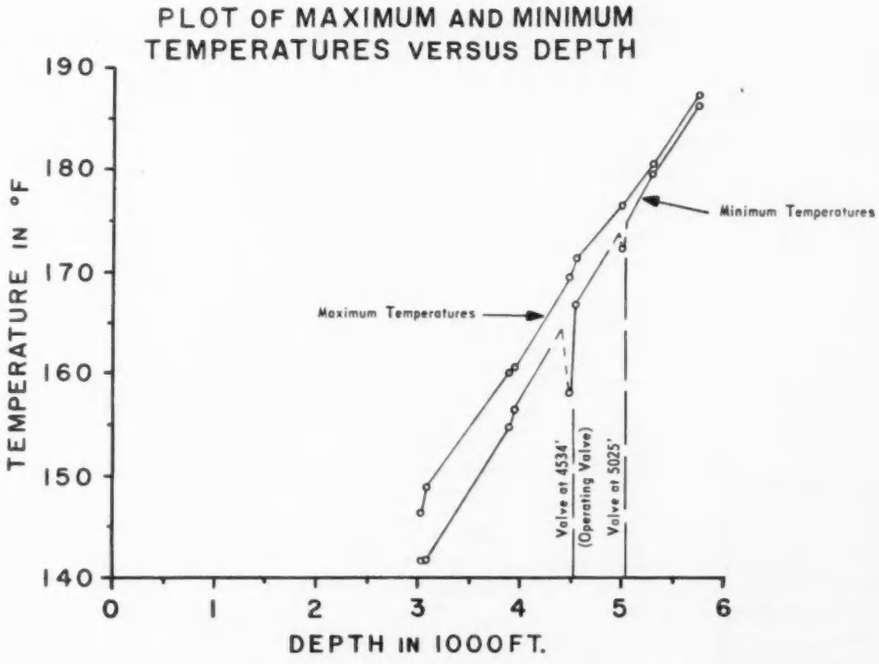
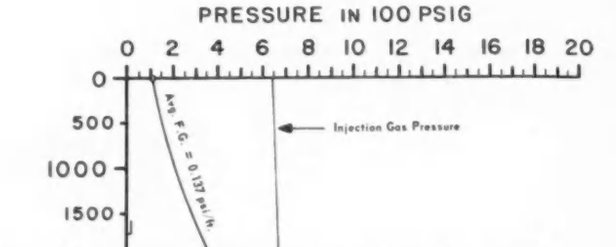
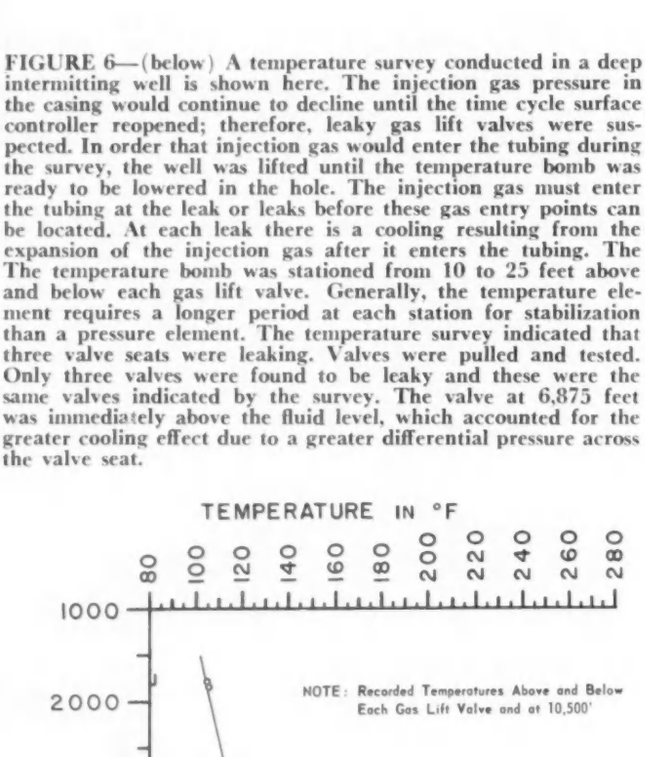


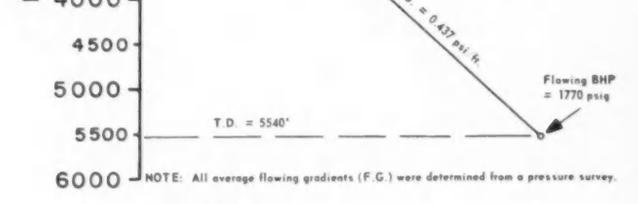
FIGURE 5—(right) This plot illustrates how tubing leaks are located by means of a pressure survey. The flowing pressure survey shown was conducted in a continuous flow gas lift well. The injection gas-liquid ratio had increased in a matter of weeks from 270 to 550 cubic feet per barrel for the same producing rate. Leaky valves were suspected prior to running the survey. However, a tubing leak was located at 2,070 feet. The pressure traverses plotted here are average gradients based on the pressure survey. Numerous stops were required to establish the average gradients and pinpoint the leak.

FIGURE 6—(below) A temperature survey conducted in a deep intermitting well is shown here. The injection gas pressure in the casing would continue to decline until the time cycle surface controller reopened; therefore, leaky gas lift valves were suspected. In order that injection gas would enter the tubing during the survey, the well was lifted until the temperature bomb was ready to be lowered in the hole. The injection gas must enter the tubing at the leak or leaks before these gas entry points can be located. At each leak there is a cooling resulting from the expansion of the injection gas after it enters the tubing. The The temperature bomb was stationed from 10 to 25 feet above and below each gas lift valve. Generally, the temperature element requires a longer period at each station for stabilization than a pressure element. The temperature survey indicated that three valve seats were leaking. Valves were pulled and tested. Only three valves were found to be leaky and these were the same valves indicated by the survey. The valve at 6,875 feet was immediately above the fluid level, which accounted for the greater cooling effect due to a greater differential pressure across the valve seat.


PRESSURE IN 100 PSIG
0 2 4 6 8 10 12 14 16 18 20
DEPTH IN FEET
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000
Avg. F.G. = 0.137 psi/ft.
Injection Gas Pressure
Injecting Gas Through Tubing Leak at 2070'
Avg. F.G. = 0.275 psi/ft.
Injecting Gas Through Gas Lift Valve at 2935'
Avg. F.G. = 0.437 psi/ft.
Flowing BHP = 1770 psig
T.D. = 5540'
NOTE: All average flowing gradients (F.G.) were determined from a pressure survey.

WELL DATA:
2" Tubing in 5-1 2" O.D. Casing
Producing 640 BFPD (5 BOPD)
Injection Gas-Liquid Ratio = 550:1
Surface Injection Casing Pressure = 640 psig
Producing Wellhead Tubing Pressure = 110 psig


TEMPERATURE IN °F
80 100 120 140 160 180 200 220 240 260 280
DEPTH IN FEET
1000 2000 3000 4000 5000 6000 7000 8000 9000 10,000 11,000
NOTE: Recorded Temperatures Above and Below Each Gas Lift Valve and at 10,500'
Leaky Valve
Fluid Level
Leaky Valves


700 PSIG OPERATING GAS LIFT VALVE
Maximum Pressure (658 PSIG)
Maximum Pressure (655 PSIG)
A
B
C
D
Valve Opens (385 PSIG)
Valve Opens (374 PSIG)
Minimum Pressure (323 PSIG)
PRESSURE IN PSIG
700 650 600 550 500 450 400 350 300 250 200
0 10 20 30 40 50 60 70 80 90 100
TIME IN MINUTES

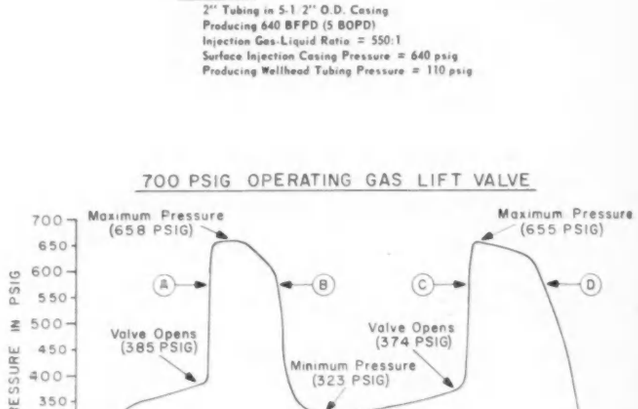

900 PSIG OPERATING GAS LIFT VALVE
Maximum Pressure (885 PSIG)
Maximum Pressure (890 PSIG)
Valve Opens (292 PSIG)
Valve Opens (283 PSIG)
Minimum Pressure (222 PSIG)
PRESSURE IN PSIG
900 850 800 750 700 650 600 550 500 450 400 350 300 250 200
0 10 20 30 40 50 60 70 80 90 100
TIME IN MINUTES

FIGURE 7—Here are two bhp surveys from the same well. The bomb was positioned immediately above the standing valve at 6,580 feet in the two-packer chamber installation in both cases. The well is cased with 5½-inch O.D. pipe and is producing through 2-inch tubing.

sure valves to efficiently gas lift the well from 10,000 feet with available injection gas pressure.

If a pressure survey had been conducted prior to installing gas lift valves, the operator would have saved the initial equipment cost of at least six gas lift valves, latches and mandrels, eliminated the wire line expense of changing the gas lift valves, and prevented loss of production. The lower mandrels could have been spaced further apart by assuming the kickoff injection gas pressure for the top valve at 6000 feet, thus saving one or more valves below the static fluid level. Fortunately, valves were wire line retrievable and the design could be changed at relatively low cost.

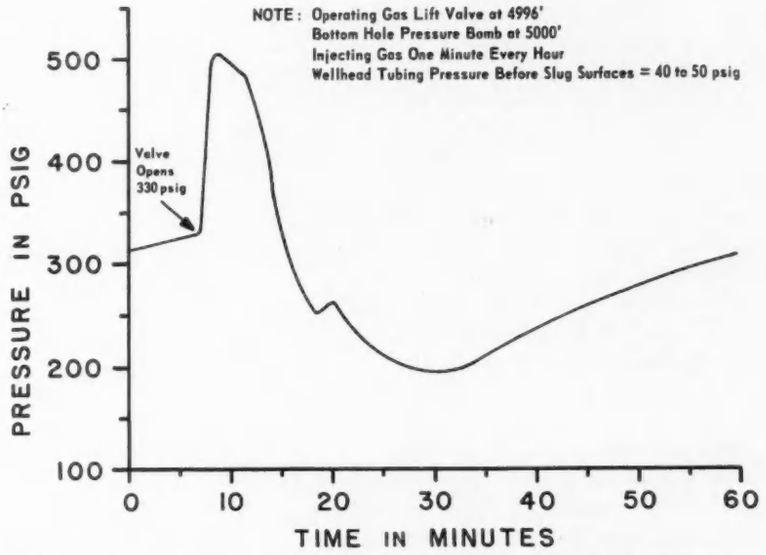


FIGURE 8—This pressure survey was conducted on an intermitting gas lift well to determine the percent "fall-back." The well was producing approximately 1.3 barrels per cycle through 2-inch tubing. From the survey, the pressure in the tubing above the valve at the instant the valve opened was 330 psig. Subtracting the pressure due to wellhead tubing back pressure, the initial fluid column above the valve would represent approximately 3.5 barrels (measured static fluid gradient—0.31 psi per foot in this well). Therefore, the percent recovery was 37 percent and the fall-back was 63 percent.

Productivity index for proper design. Static and flowing bottom hole pressures should be obtained prior to designing a gas lift installation. With this information a PI can be determined and the proper gas lift valve design calculated. The maximum temperature obtained during the pressure survey should be used to establish a temperature gradient for calculating gas lift valve operating pressures at valve depths in the well.

Flowing pressure traverse for continuous flow. A flowing pressure traverse below the point of gas injection is needed to calculate the depth of the operating valve in a continuous flow installation. A pressure traverse is established by recording flowing pressures at several depths between the required point of gas injection and total depth. If the well is on gas lift and it is desired to improve the installation, the flowing gradient below the point of gas injection can be established before pulling valves. The operator can readily calculate the point of gas injection for the available injection gas pressure and desired flowing bhp when an average flowing gradient below the point of gas injection is known, as shown in Figure 1.

Pressure build-up curve for intermittent design. A pressure build-up curve is useful for properly designing an intermittent gas lift installation and determining proper injection gas frequency for maximum production. A pressure build-up curve is an indication of a reservoir's capability to deliver fluid into the wellbore. Hypothetical pressure build-up curves for two types of intermitting wells are shown in Figure 2. Generally, pressure will increase rapidly at the beginning of the test when the difference between the static and flowing bottom hole pressure is great, as indicated by Curve 1. As the differential is reduced, the increase in pressure with time diminishes.

Curve 1, which is typical of many intermitting gas lift wells, illustrates a well with a higher bhp and much lower PI than the well illustrated by Curve 2. The depth of the operating valve, injection gas cycle frequency and tubing size selection can be determined from the pressure build-up curve. For maximum production, the average flowing bhp should be maintained in the steeper portion of Curve 1. A smaller tubing size, such as 2 inch nominal, generally is preferred for this type of well to provide more efficient intermitting lift for maximum drawdown.

The third curve is a plot of time versus rate of feed-in for a high bhp low productivity well (Curve 1) and illustrates the need of remaining in the steeper portion of the build-up curve for maximum production in many intermitting wells with a pressure build-up curve similar to Curve 1. However, there are wells which should not be produced with an excessive drawdown. Depending upon the type of oil reservoir, excessive drawdown can result in wells producing practically all gas or being ruined by coning water.

Curve 2 illustrates a well with a low bhp and high PI. A chamber design should be used for gas lifting this type of well. For maximum producing rate, a large tubing size should be employed. The chamber installation is advantageous over a plunger installation because the maximum number of injection gas cycles per day with a chamber installation significantly exceeds those possible with a plunger. In the plunger installation, production is lost due to the time required for the plunger to return to the bottom of the well.

CONDUCTING SURVEYS IN INTERMITTING WELLS

Certain precautions are necessary for conducting a pressure or temperature survey in a producing intermitting gas lift well. In some wells the survey must be conducted while producing the well to determine the operating valve or efficiency based on liquid fall-back. The depths of all gas lift valves should be known prior to beginning the survey. Difficulty in running the bomb generally will occur above the fluid level when the liquid slug being lifted by the injection gas slams into the bomb. If a temperature survey is being conducted to determine the operating valve, it is desirable to record the temperature in the tubing immediately above and below

each gas lift valve below the fluid level. There is no reason to begin the survey until the fluid level is reached since the operating valve must be below this depth. This also holds true for the pressure survey. Recording depths for the pressure survey are not as critical as those for the temperature survey. The bomb with a temperature element should be stationed close enough to each valve to positively detect any cooling effect from injection gas entering the tubing through the valve. The temperature or pressure bomb should remain at each recording depth throughout at least one (preferably two) complete injection gas cycles.

There have been special tools designed to prevent a bomb from being blown up the hole. These devices generally have one disadvantage. If the tool will prevent a bomb from being blown up the hole it also is capable of sticking the bomb in which case tubing might have to be pulled.

Another method for surveying intermitting wells was employed for several of the surveys presented in this article. A heavy, small O.D. two section stem was run above the bomb. To increase the weight per unit length, a hollow stem filled with lead was used. The stem can be made heavier by using mercury instead of lead. The stem O.D. was slightly less than the diameter of the bomb (1¼ inch O.D.). The disadvantage of using a special stem is the additional required length of lubricator.

Smaller tubing sizes require increased precaution. As the slug surfaces, pressure is reduced and the space occupied by the gas increases, resulting in higher velocities. The clearance between the bomb and tubing is much less in 2-inch tubing than in 2½-inch tubing. Initial surveys in intermitting wells should begin at the maximum depth to be recorded below the gas lift valves. The survey should be continued above each succeedingly higher valve until significant line jerk is felt at the surface. Since the bomb then is obviously above the operating valve, survey should be discontinued.

LOCATING OPERATING VALVE

An intermitting gas lift well being produced by a high injection gas cycle frequency represents one of the most difficult types of wells in which to locate the operating valve. This category well usually is between an intermitting well and a continuous flow well. The point of gas injection is too deep for efficient continuous flow; therefore, the well is intermitted as rapidly as possible for maximum production. In this case a temperature survey generally is more quantitative than a pressure survey for locating the operating valve (Figures 3 and 4).

LOCATING HOLE IN TUBING OR LEAKY VALVES

Tubing leaks, cutout valve seats and packer leaks are indicated by a continual decrease in injection gas pressure after the injection gas is shut off and the operating valve has closed. In an intermitting well, the injection pressure in the casing will not remain equal to the surface closing pressure of the operating gas lift valve between gas injections. Instead, the casing pressure continues to decline until the time cycle surface controller reopens for the next injection gas cycle. Temperature and pressure surveys can be used to locate a leak in the tubing string which includes leaky gas lift valves (Figures 5 and 6).

ANALYZING GAS LIFT INSTALLATIONS

Chamber installations. Two bottom hole pressure surveys for the same chamber installation are shown in Figure 7. During the first survey the operating valve had an opening pressure of 700 psig. The pressure build-up curve after the valve opened was flat and wide (between points A and B and points C and D) which indicated the fluid load in the chamber was near the opening pressure of the operating valve. The well was producing approximately 115 barrels of total fluid per day (11 barrels of water) with an injection gas-liquid ratio of 2,355 cubic feet per barrel.

The operating valve was replaced with a 900 psig opening pressure gas lift valve prior to running the second survey. The higher pressure valve increased the production rate to 153 barrels of total fluid per day (67 barrels of water) with an injection gas-liquid ratio of 1,445 cubic feet per barrel. The increased water percentage occurred during the nine months between the two tests.

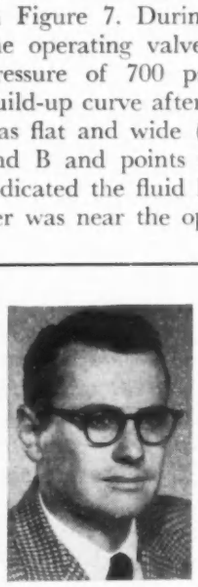
These surveys illustrate the importance of designing a chamber installation for adequate differential between the injection gas pressure and the maximum pressure required to unload the chamber. Although the maximum pressure build-up in the chamber after the valve opened was greater with the higher pressure gas lift valve, the lower minimum drawdown and increased recovery indicated a significant increase in operating efficiency. Adequate differential pressure reduced the fall-back although the water percentage had increased.

Fall-back in intermitting wells. Many times it is desirable to determine the percent of liquid recovered in relation to the total initial fluid head above the gas lift valve at the instant the valve opens. A typical pressure survey in a 5,200-foot well on intermitting gas lift is shown in Figure 8. The operating gas lift valve is located at 4,996 feet and the bomb was stationed at 5,000 feet for the survey. The time cycle surface controller on the injection gas line was open one minute each hour. Interpretation of the survey (see Figure 8) indicates that the percent recovery was 37 percent and the fall-back was 63 percent.

This type of data is valuable for selecting the proper injection gas cycle frequency and length of injection for minimum fall-back, predicting maximum producing rates by intermittent lift for similar well conditions, evaluating injection gas pressure in relation to fall-back, etc.

The author is indebted to C. W. Walts with Richardson and Bass for much of the material presented here. This article is based on a paper presented to the Sixth Annual West Texas Oil Lifting Short Course, in Lubbock, Texas, April 23, 24, 1959.

—The End



About the Author

H. W. Winkler is a graduate of Southern Methodist University with a degree in mechanical engineering. After working for The Atlantic Refining Company from 1948 to 1952 as a production engineer, he joined Camco Gas Lift Company in West Texas as a sales engineer. He came to Houston with Camco, Incorporated, as assistant chief engineer of gas lift in 1954. At present he is doing graduate work at the University of Houston. He is a registered professional engineer and a member of AIME.

Gilsonite reduces lost circulation when cementing

This lightweight additive increases compressive strength of cement, maintains good corrosion resistant properties, and shows no softening effect at high temperatures

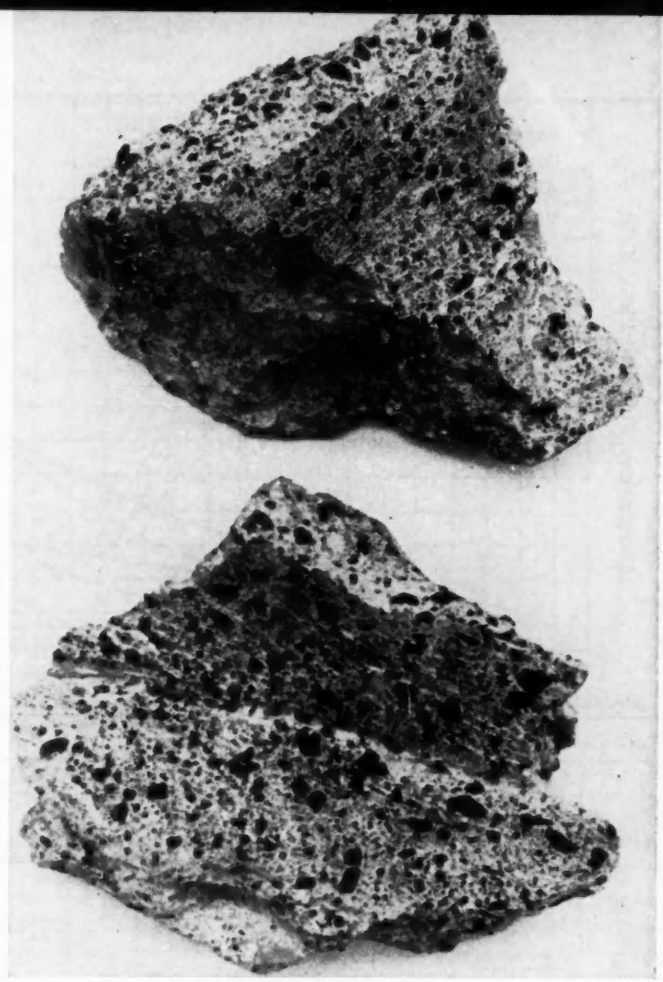


FIGURE 1—Even distribution of gilsonite cement.

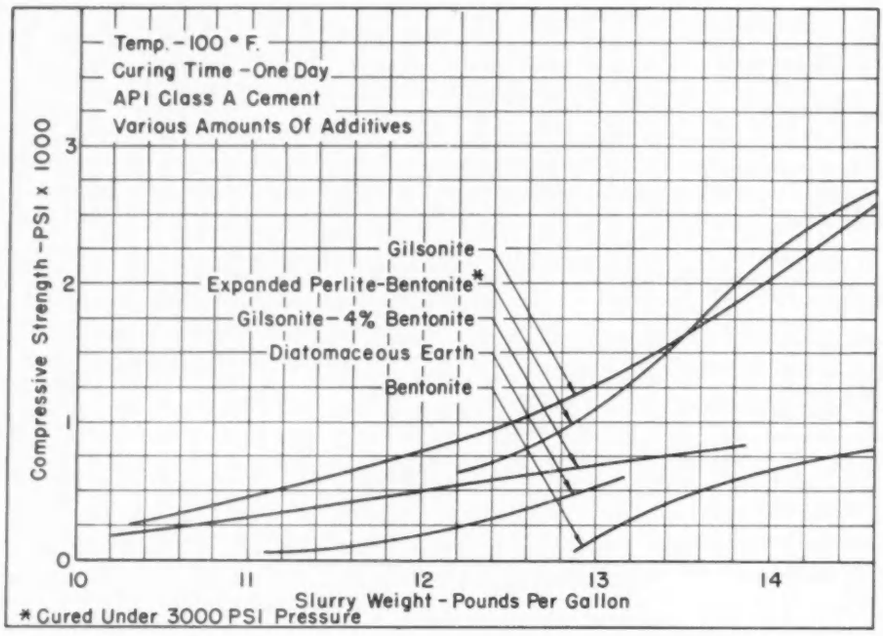
By Knox A. Slagle and L. Gregory Carter, Engineers
Halliburton Oil Well Cementing Company, Duncan, Okla.

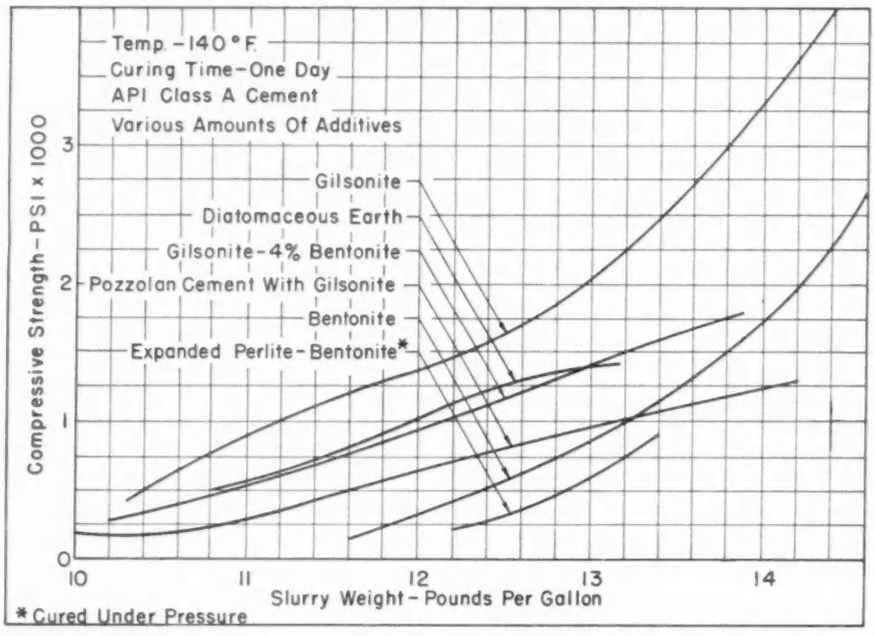
As THE OIL-PRODUCING industry continues to grow, the need for a low-density cementing slurry possessing lost circulation control characteristics has become more and more evident. This is especially so in primary cementing because of the different types of formations being encountered and the need to reduce remedial cementing operations. These problem formations may range from either porous or cavernous formations to very weak formations that are unable to support the hydrostatic head that is necessary for drilling and well completion. This latter type of formation will often break down or fracture under hydrostatic loading, resulting in partial or complete loss of circulation.

Lost circulation zones encountered during drilling operations may produce many problems in the normal course of completing a well. Increased expenditures can result from reduced drilling rates, fishing jobs, and other mechanical difficulties as well as from loss of large volumes of drilling fluid. Sometimes severe lost circulation problems can even cause abandonment of a well. Lost circulation during cementing operations will often be reflected by inadequate fill-up in the annulus and the consequent displacement of slurry into formations away from the well bore. Satisfactory isolation of the different formations may then require re-cementing work above the point of loss and subsequent squeeze cementing jobs. Inasmuch as rather extensive information has been

These additives have been used to control lost circulation zones during cementing:

1. **Bentonite**—Concentrations of from 0 to 12 percent by weight of cement have been used. It was used for the purpose of decreasing the slurry weight and increasing the slurry volume. Bentonite has the affinity to absorb any excess water that is present. In absorbing this water the strength of the cement should be increased and increase the resistance to combatting corrosion conditions.
2. **Diatomaceous earth**—This material is used as a lightweight additive. Large quantities of water is necessary when using this material resulting in low compressive strength.
3. **Pozzolanic additives**—Relatively good strengths are realized with this material because of the reaction of this material with the hydrated lime that the cement yields. Also various bridging materials may be successfully used.
4. **Expanded perlites**—This material has been relatively successful; however, additional water is necessary to have a pumpable slurry.





FIGURES 2 and 3—The gilsonite cement shows a high compressive strength in either of the above curing conditions.

published on lost circulation while drilling, these investigations have been directed primarily to the second phase, lost circulation while cementing, although there is some overlapping in areas where cementing slurries with excellent bridging properties may be used advantageously to restore mud circulation.

Attempts have been made to restore circulation while cementing using many types of materials. Sometimes sufficiently good results have been obtained simply by reducing the slurry density whereas other instances have occurred where bridging materials were found to be most helpful, but there still remained zones of loss which would not react satisfactorily to either of these methods. Combinations of these two approaches have also been utilized, but it has been difficult to obtain optimum bridging and density without sacrificing other desirable slurry properties such as strength and resistance to corrosive fluids.

All of these various types of slurries have been used to control lost circulation problems under some limited conditions and certain areas of the country may obtain adequate results from their use. However, none of them have shown the over-all effectiveness, particularly in the severe lost circulation zones that has been exhibited thus far by the use of gilsonite.

Source of gilsonite. Gilsonite is a relatively new and unique additive for the oil industry's use to combat lost circulation conditions. This material is a solid hydrocarbon that occurs principally in the Uinta Basin of Utah and Colorado. These are not only the largest deposits in the world, but also the most extensively developed. It has been generally grouped as a form of native asphalt, but its unusual properties make it markedly different from the bitumens or asphalts which may range from liquid to definite solid form whether native or processed. Gilsonite is mineralogically classified as asphaltite.

The following conclusions were made after extensive field and laboratory operations:

- Field results on over 100 primary-cementing jobs indicate that in lost circulation areas where only 50 to 60 percent fill-up can be attained with other types of lightweight or lost circulation additives, 80 to 90 percent fill-up can be realized by the use of gilsonite in a cementing slurry. Also it has been found that 25 to 50 pounds of gilsonite per sack of cementitious material will generally be an optimum amount for controlling lost circulation zones and that, where weak formations exist, the bridging properties of gilsonite will allow use of 12.5 to 13.5-ppg slurry weights for excellent cementing results whereas other types of slurries have not been satisfactory even at much lower weights.
- In most areas where gilsonite has been used it appears that its scouring action is very good in removing drilling fluid and filter cake from the hole, resulting in a better cementing job without the necessity of block squeezing.
- Both laboratory and field data show that gilsonite is compatible with existing cementing compositions and additives and the only precautions necessary are to minimize the use of high water-ratio additives which may

TABLE 1—Physical Properties of Evenly Distributed Gilsonite in a Set-Cement Sample

Specific gravity	1.07
Bulk density lb per cu ft	50
Water requirement, gal per bulk cu ft	2 (approx.)
Melting point, °F	385 to 525

materially reduce the strength and durability of the gilsonite blends. Accelerators, retarders, and low-water-loss additives can and should be used when specific well conditions warrant them.

- Compressive strengths attained with gilsonite are higher than for other light-weight additives when comparison is made on the basis of slurry weight. The primary reason for this is because weight reduction is obtained by use of a low specific gravity solid rather than by large volumes of water.
- Because of its excellent bridging properties, certain precautions should be recommended when using gilsonite cement. Because it does have a low specific gravity and may float and accumulate in a slurry of low viscosity, water should not be used ahead of the slurry because of potential dilution and viscosity reduction. The preferred fluid ahead of gilsonite would be a mixture of bentonite and water (300 pounds per 15 barrels). The slurry should also be mixed at the recommended weight throughout the job.
- Equal or superior resistance to corrosive waters because the material itself is chemically resistant to both acidic and alkaline solutions.
- The effect of high temperatures, 240°-300° F. with regard to softening and aglomeration of the gilsonite, showed no apparent sticking together of the separate particles. Also no appreciable softening of the material was indicated.
- Gilsonite is more soluble in solvents such as kerosine and naphtha than in various crude oils. However, during the laboratory tests no detrimental effects were noted in the cement when kerosine was exposed to the gilsonite cement sample.

Laboratory investigations. Gilsonite was first evaluated as a density-reducing additive for cementing slurries because of its low specific gravity (1.07). Laboratory testing was set up to establish an optimum particle size for these applications with three primary points being considered:

1. Maximum size to permit pumping through down-hole cementing equipment such as float collars and multiple-stage collars.
2. Minimum size to provide excellent control of lost circulation zones.
3. Proper particle size distribution to obtain the two preceding objectives and to also allow slurry preparation with a minimum amount of mixing water.

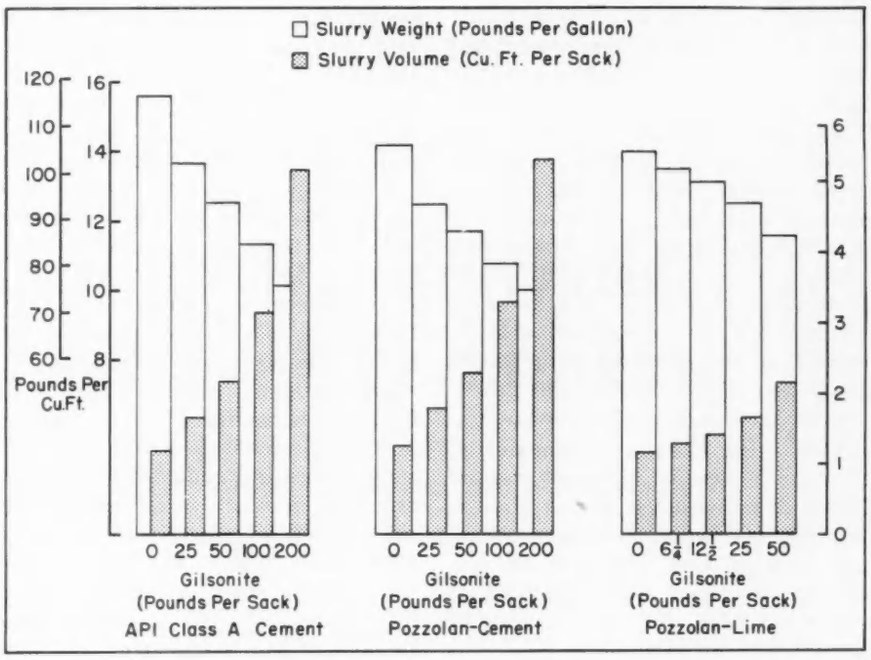


FIGURE 4—Slurry properties of gilsonite cement.

Field results. Gilsonite has been used in nearly all areas of the country for many different cementing operations. Table 2 lists the types of jobs performed in the various areas.

A discussion of the different types of jobs in the various areas and a summary of the various well conditions encountered in the different locations where gilsonite cement and other types of cement compositions have been used should be of benefit in assessing the potential value of this additive.

In the Oklahoma area most of the gilsonite cement jobs that have been performed were squeeze jobs to correct inadequate fill-up. In one southern Oklahoma field a 1,500 psi dry test was obtained after a squeeze job using 25 pounds of gilsonite per sack of API Class A cement with a low-water-loss additive and an accelerator. This successful repair job followed six other attempts with various types of cementing compositions during which it was impossible to attain a satisfactory squeeze pressure. Since this initial success, four other wells in the same field which were reported after Table 2 was prepared have been satisfactorily squeezed on the first attempt using the gilsonite cement with squeeze pressures of 2,000 to 4,500 psi. These jobs were in a rotten-shale section and consideration is now being given to using gilsonite cement for primary cementing in an attempt to avoid the remedial jobs. In another field one zone in a well was to be isolated for salt-water disposal. After three unsuccessful attempts, with 100 to 150-sack batches of API Class A cement with a low-water-loss additive each time, to obtain squeeze pressure through the perforations a blend of 15 pounds of gilsonite per sack of cement plus a low-water-loss additive was tried and a pressure of 4,000 psi ob-

TABLE 2—Various Types of Cementing Jobs in Numerous Areas Have Proven Very Successful While Using Gilsonite Cement

Areas	Total Jobs	Production	Intermediate	Surface	Squeeze	Plug-back	Recement
Oklahoma	10	1	1	..	6	2	..
Illinois-Indiana	4	..	..	..	1	3	..
Rocky Mountain	5	1	..	1	..	..	3
Central Texas	2	..	..	..	1	1	..
N. Louisiana-Mississippi	6	4	..	..	2	..	..
East Texas	4	..	..	..	1	2	1
West Texas	28	14	2	..	3	8	1
Texas Gulf Coast	28	..	..	3	..	25	..
South Louisiana	24	2	4	18	..	..	..
New Mexico	15	10	1	1	..	3	..
Kansas-Texas Panhandle	74	31	4	3	15	18	3
Total	200	63	12	26	29	62	8

tained after 15 sacks were displaced into the formation. Excess cement was backwashed and the squeeze tested to 3,000 psi. After cement had set under 1,500 psi pressure, no cement was found inside the pipe and the perforations were tested to 3,000 psi without any leaks. Other squeeze jobs have also been satisfactorily performed with gilsonite cement after 2 to 5 failures with other types of cements, and as a consequence interest has definitely increased in the potential value of 10 to 25 pounds of gilsonite per sack of cement for this type of application.

Only a few gilsonite cement slurries have been used in the north central Texas area inasmuch as lost circulation has not been a serious problem, but there was one very interesting operation performed. Insufficient fill-up was obtained on the primary-cementing job without gilsonite so eight perforations were placed in the casing over a 2-foot interval above the top of the cement at approximately 3,850 feet. A pozzolanic-cement slurry containing 100 pounds of gilsonite per sack and mixed at 10.8 ppg was circulated through these perforations to approximately 2,700 feet where a split was found in the 5½-inch casing. The packer was then raised above this split and the remaining slurry displaced at this point to bring the cement column to 2,100 feet. The upper stage was overdisplaced with five barrels of water and the split casing was later repaired by squeezing. A significant observation from this job was that a relatively high concentration of gilsonite was successfully pumped through eight perforations and through a split in the pipe without any premature bridging.

In southern Arkansas there is a field which has from 2 to 5 gas pays and usually requires the use of a two-stage cementing collar plus considerable squeeze work to get proper fill-up and allow separate fracturing of each zone. Three gilsonite cement jobs with a pozzolan cement blend have been done in this area without the benefit of a stage collar and with adequate fill-up being obtained and no squeezing required to segregate the producing intervals. Other jobs in this general area have used gilsonite for its bridging effect in squeeze cementing, with all jobs reported thus far being achieved satisfactorily.

The Texas Gulf Coast area has primarily used this material for plug-back operations for lost circulation in fractured and faulted formations where several wells have been lost. Very good results have been obtained in restoring circulation. In another field, gilsonite slurries have been the only type which would permit circulation while setting surface and conductor pipe.

West Texas is a notorious area for lost circulation problems and gilsonite has contributed materially to successful cementing operations in this area. In one field considerable trouble is encountered when setting production pipe because of two very weak formations. Prior to the introduction of gilsonite all types of bridging materials and lightweight slurries had been tried with at least two or three stages being required. Most of these jobs showed fluctuations in pressure while pumping which indicated the breaking down of the weak formations while cement was being circulated. Five single-stage jobs have been reported using gilsonite with a steady build-up of pressure from the time cement reaches the formations until the top plug was landed. Temperature surveys indicated fill-up of 90 percent or better on each of these jobs whereas other types of slurries required more slurry volume and staging in order to attain this fill-up.

The majority of the jobs in the New Mexico area using gilsonite cement have been setting production liners in gas wells where extremely weak formations exist. The first two jobs run in this area were on gas-drilled wells at a depth of approximately 6,000 feet with a 5½-inch production liner being set in a 6¾-inch hole. Both jobs were cemented using API Class A cement containing gilsonite. After the liner was cemented the drill pipe was raised to reverse out any excess cement slurry above the top of the liner with gilsonite cement slurry being returned to the surface on both jobs, indicating that cement had completely circulated the liner. Calculations on both jobs indicated that only 25 to 35 percent excess volume of gilsonite cement was needed to circulate the liners compared to 200 percent excess which was used with other types of additives without being able to circulate completely because of lost circulation zones.

In another field in New Mexico cement could not previously be circulated on a long string because of a weak coal bed lying near the top of the producing zone. The wells in this area that have been cemented using gilsonite have been very successful with gilsonite slurry being circulated out during the jobs indicating no loss of slurry to the thief zones.

Because of the difficulty encountered from lost returns while drilling in one field, a well finally had to be shut down because the hole could not be filled with mud containing other lost circulation materials. The fluid level was approximately 650 feet from the surface. Gilsonite cement was used to set a 7-inch casing at the depth of lost circulation and returns were established for the first time. Drilling was continued with returns being lost at four additional formations. In each instance, API Class A cement containing 100 pounds of gilsonite per sack of cement was used in a plug-back-cementing operation which allowed a standing pressure of 800 to 1,500 psi to be placed on each zone of loss.

Complete circulation was regained when drilling was resumed through each plug. Many wells have been completed in this area using gilsonite cement where prior to its introduction some of the holes had to be aban-

Continued on Page 190

About the Authors

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Carter

Knox A. Slagle received his B.S. degree in chemical engineering from the University of Oklahoma in 1948. He was employed by Halliburton Oil Well Cementing Company in Duncan, Okla., following graduation. At present he is a development engineer in the cement section of the research and development laboratory of Halliburton Oil Well Cementing Company working with oil well cementing materials.

Greg Carter received his B.S. degree in chemistry and mathematics from Southeastern State College in Durant, Okla., in 1954. He held a teaching position before joining Halliburton Oil Well Cementing Company where he now serves as a senior chemist in the cement section of the research and development laboratory.

Here's how new additives improve deep well cementing

They . . . 1. Decrease setting time 2. Lower the water loss 3. Control density

By J. O. Woodson, Engineer
Phillips Petroleum Company
Midland, Texas

C. L. Fulton, Engineer
Halliburton Oil Well Cementing Company
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DURING 1958 Phillips Petroleum Company completed drilling operations on three deep wells in Pecos County, Texas. All three wells were drilled below 19,000 feet. Two of the wells surpassed the depth recorded as it existed at the beginning of 1958. When drilling operations were completed and production tests began on the three wells, a cumulative total of 67,760 feet of hole had been drilled, and 14 separate strings of casing, totaling 136,790 feet had been set and cemented. This accomplishment required the complete cooperation of Phillips Petroleum Company personnel with the many companies engaged to perform the various operations necessary to drill and complete these wells.

Development of the materials and equipment which made possible the successful cementing of these wells was begun several years ago. Consequently, the materials and equipment used were not experimental in any respect. The exact cement blends and cementing equipment to be used on each cement job were selected only after careful planning and study.

Several conclusions were reached during the process of testing of the cement blends in the laboratory and field:

- At bottom-hole temperatures above 260° F., it is advisable to test the cement blend to be used before the job is performed.
- It was found that retardation of cements at high temperature becomes increasingly more difficult as slurry densities are decreased below approximately 13.5 pounds per gallon.
- On deeper cement jobs where a large volume of cement is used, it is desirable to mix and displace the cement at an optimum rate without stopping the movement of the slurry at any time until the follow-up plug was bumped.
- Where gas-cut muds are experienced, pressure should be applied to the annulus at the surface after the cement has been placed and this pressure left on the annulus until the cement has obtained its initial set. This is necessary in an effort to prevent migration of fluids, particularly gas, from the formation into the well bore while the cement slurry was still in a fluid state.
- Casing centralizers were not used on the production, conducter, or shallow surface strings. It was recommended not to run centralizers on the production strings because of the extreme depths involved when rotating or reciprocating.
- A cement blend having far superior qualities for deep, high-temperature squeeze jobs can be obtained by using a silica flour.

Although this article is concerned primarily with the cementing jobs performed on three particular wells, general new developments in the field of cement technology will be discussed.

Materials. The materials used in cementing operations can be divided into general classes, depending upon the function of the material. Basically, the primary material is cement. Portland cement is the oldest and has been the most widely used type of cement. Although one might assume that a material which has been used as long as portland cement could be altered very little in its properties, this is far from being true. At the time when wells were no deper than 5,000 or 6,000 feet, common portland or construction cement could be used for all cementing operations on these wells. As wells were drilled deeper with accompanying increases in down-hole temperatures and pressures, it soon became apparent that common portland cement could not meet all the needs of the petroleum industry. A cementing service company developed and patented the first retarded set cement which could be pumped to

The additive—diatomaceous earth—enables the addition of large quantities of water to cement slurries without separation of the solid particles

greater depths than the construction cements. As the industry grew more specialized, cements such as the sulfate resistant types were developed. The many types of portland cement developed led to an API system for classification and the development of API pecifications for these cements. This system now provides for seven classes in regular and sulfate resistant types.

There is a narrow density range to which neat cements should be slurried. For most neat cements, this density range is in the order of 1.5 pound per gallon for API Class E cements. The proper density range might vary with different brands of cement but will be determined in each case by the water-cement ratio that must be used to provide a pumpable slurry, yet one that will not result in separation of free water upon setting. When a cement is mixed heavier than the recommended density, its thickening time may be materially reduced or the slurry may be too thick to be pumped. On the other hand, when a cement is mixed lighter than the recommended minimum density, separation of the solid particles from the slurry may occur to the extent that free water pockets will exist within the cement column. The amount of mixing water required will depend to a great extent on the fineness of grind of the cement used.

Inasmuch as it is usually desirable to mix a cement to a density equal to or only slightly greater than the mud density used to drill the well, it becomes obvious that density control of cement slurries over wide ranges is a desirable property. Materials used for density control can be divided into two classes: weighting materials and light-weight materials. A common material used to increase cement-slurry density is drilling-mud barite. Other materials such as iron arsenate, galena, ottawa sand and, most recently, ilmenite ore have been used for this purpose. Ilmenite ore, allows the formulation of heavier cements without the viscosity problems associated with barite.

Because cement slurries are relatively high on the mud-density scale, more effort has gone into finding suitable materials which can be used to reduce the density of these slurries. One of the first light-weight materials to be added to cements was bentonite. This material is still widely used. Bentonite allows more water to be added to the cement without causing separation of the solid particles. The next material to attract a great deal of attention was expanded perlite. This material is normally used with bentonite cement slurries. The addition of the bentonite in the perlite cement blend reduced the floatation of the perlite particles and results in a more uniform slurry. The additional water required for both the perlite and bentonite results in a lighter-weight slurry. As expanded perlite breaks down under pressure allowing fluid to saturate the interior of the particle, the slurry weight of cement containing this material increases as it is pumped down-hole. For this reason, slurry weights on the surface must be carefully controlled to assure the proper weight and viscosity in the well under pressure.

The next development in light-weight slurries was the addition of pozzolanic materials to cement. This resulted in a cementing material having the advantages of density control in the range of 13.5 to 15.5 pound per gallon without the susceptibility to deterioration by corrosive waters experienced with bentonite cements. Other properties such as better perforating characteristics and less expansion on setting were achieved.

The most recent development in density control is the use of diatomaceous earth. This material is an additive containing very little aluminum. It permits a tremendous amount of water to be added to the cement slurry without separation of the solid particles. This material, was used for density control in cementing the three deep wells to be discussed in this paper.

The slow-set cements available from the cement industry cannot be expected to meet all of the conditions encountered in oil-well cement. However, they are excellent starting materials for many modifications. These modifications include retardation and water-loss control, as well as density control. A number of materials have been used as cement retarders. One of the first of these was common sugar. Although an excellent retarder, this material had many disadvantages. Other retarders used with varying degrees of success have included oxidized cellulose, sodium tannate dextrin, pyrogallic acid, and calcium lignosulfonate. The most recent development in the field of retarders is the tongue twister, carboxymethyl hydroxyethyl cellulose (CMHEC). Like many other retarders, this material incorporates other desirable properties along with retardation. Most retarders are also dispersants. On the other hand, CMHEC helps suspend the cement particles, and thus is a very good material to use with weighted cements. This material also imparts effective low-water-loss characteristics to cement slurries. Many retarders reverse their action and become accelerators at high concentrations. As CMHEC does not have this characteristics, it could be used to successfully retard cements for the extremely deep wells drilled in Pecos County. This material has been used for cement retardation in other deep, high-temperature wells such as the Richardson & Bass—Mecom—Freeport—Humble — LI&E —State 2414, Well No. 1-L in South Louisiana (17) and Shell Oil Company's Rumberger 5 recently drilled near Elk City, Okla.

Oil well cements must be retarded under the deep-well conditions because increased temperatures and pressure reduce the thickening time or pumpability of the slurry. In addition, high temperatures and extreme pressures have other effects upon cement slurries placed and set under these conditions. Studies have shown that cements attain lower early strengths when cured above a certain maximum temperature, or that they lose strength with time at temperatures above this critical temperature. Any cement cured above this critical temperature reaches a maximum strength and then

begins to lose strength with time. The point at which this maximum strength is reached depends upon the curing temperature. It was also found that an increase in the pressure at which the cement is cured decreased the amount of strength retrogression and increases the temperature at which this retrogression begins. The amount of aluminum present in the cement mixture has an effect on this strength retrogression. The retrogression is lessened and begins at a higher temperature with small tricalcium aluminate content. It has been found that the addition of moderate amounts of silicon dioxide to the cement mix will reduce or eliminate this strength retrogression. Again, the aluminum content of the admix should be small to obtain the maximum benefit. Two important low aluminum sources of silicon dioxide of a particle size usable in oil well cements are silica flour, which is mined in southern Oklahoma, and diatomaceous earth. Of these two materials, silica flour is probably superior because it requires much less water. Silica flour is recommended for cements where density requirements are 14.5 pound per gallon or greater. For the lighter cements, it is necessary to use diatomaceous earth with its capacity for larger amounts of water, with the realization that certain sacrifices in strength must be made. Slow-set cements rather than portland cements were used as starting materials for the deep cement jobs in Pecos County because of their low tricalcium aluminate content.

Water-loss control is important for any cement slurry but becomes a must for deep-well cementing and, generally speaking, for most successful squeeze-cement operations. Inasmuch as more water is retained in a low-water-loss cement slurry, the water-to-cement ratio is more constant and the thickening time is more predictable. Reliable thickening times are a necessity in deep-well cementing. As a cement slurry loses its water, it becomes viscous. Higher pump pressures are then required to keep the slurry moving. These increased pump pressures may in turn rupture the formation resulting in lost circulation. Also, viscous and drier cement slurries have a greater tendency to channel because they do not flow as readily as a slurry containing the proper water-to-cement ratio. Severe water loss from a cement slurry can result in a flash set. Flash sets do not normally occur because of good mud cakes. Occurrence of a flash set when cementing an extremely deep well could result in loss of the well. Use of a low-water-loss cement on any well will result in increased fill-up because of the small amount of water lost from the slurry during placement behind the casing.

The use of CMHEC in cement has resulted in the development of a new squeeze-cementing technique. Because of its success, the technique is in common use in some areas. It was reasoned that the use of a low-water-loss cement on anticipated high-pressure squeeze jobs would minimize dehydration of the slurry permitting the entire interval of perforations to be covered. Initial pumping rates are held somewhat lower than on conventional squeeze jobs. Hesitation pumping may be necessary to obtain the desired squeeze pressure. If the desired pressure is not obtained, cement is left opposite the perforations rather than over-displaced. This method allows the use of larger volumes of cement without the danger of premature dehydration at the perforations and the resulting necessity to attempt to reverse out the major portion of the cement. Excessive thickening times are of no disadvantage as long as good squeeze pressures are developed. On the contrary, they allow more working time to insure safe placement and a successful job.

Field operations. Inasmuch as operations on all three of these deep Pecos County wells were progressing simultaneously, the cementing operations will be presented in chronological order for each well. Only those cementing operations believed to be of interest are discussed in this report. Many of the cementing jobs performed on these wells required the checking and re-checking of thickening times of the recommended slurry to insure its successful placement behind the pipe. All slurries used in these operations were formulated and tested in Phillips Petroleum Company's Technical Services division laboratory in Bartlesville. On the more critical cement jobs, these tests were re-run under the same conditions at the Halliburton Oil Well Cementing Company's laboratories in Odessa, Texas. All tests were made under standard API specifications for testing oil well cements. Tests at both laboratories were made with identical testing equipment which can simulate actual well conditions as far as temperatures and pressures are concerned. When the results of these tests did not agree, each laboratory was furnished actual samples of water, cement, and additives that would be used. The tests were then rerun until results were verified. In testing materials for some of the deeper cement jobs, it was necessary to change the formulation of the cement blend several times before a slurry having the desired characteristics for existing well conditions was obtained.

It is considered advisable to pretest the cement blend which will be used in any cementing operation where bottom-hole temperatures are expected to be 260° F. or above. A sample of the cement to be used on the job should be submitted for test, and this particular shipment of cement retained for use on this job if thickening-time tests are satisfactory. Actual samples of the additives and mixing water to be used should also be submitted for the laboratory tests. It has been observed that different brands of cement, and even separate lots or shipments of the same brand, may be inconsistent in their behavior at extremely high temperatures. This is not generally cause for concern as long as the aforementioned precautions are taken and these peculiarities are known.

The performance of both crews and equipment during the various cementing jobs performed on the Pecos County wells left nothing to be desired. The operations on each job were more or less routine. In order for deep-well cementing operations to appear routine, maximum coordination among the personnel of the service company, drilling contractor, and operator is required. Advanced planning of the job procedure is necessary, and proper supervision is required to assure that the planned procedure is carried out. The location of each equipment item must be clearly identified and its function understood by the men on the job. This is also true for mud lines.

Harral A No. 1. Data pertaining to all casing strings set and cement in the Harral A No. 1 well are shown in Figure 1. Routine cementing practices were used to set 85 feet of 26-inch casing to 36-inch hole and 1,560 feet of 20-inch casing in 24-inch casing in 24-inch hole. A 12¼-inch hole

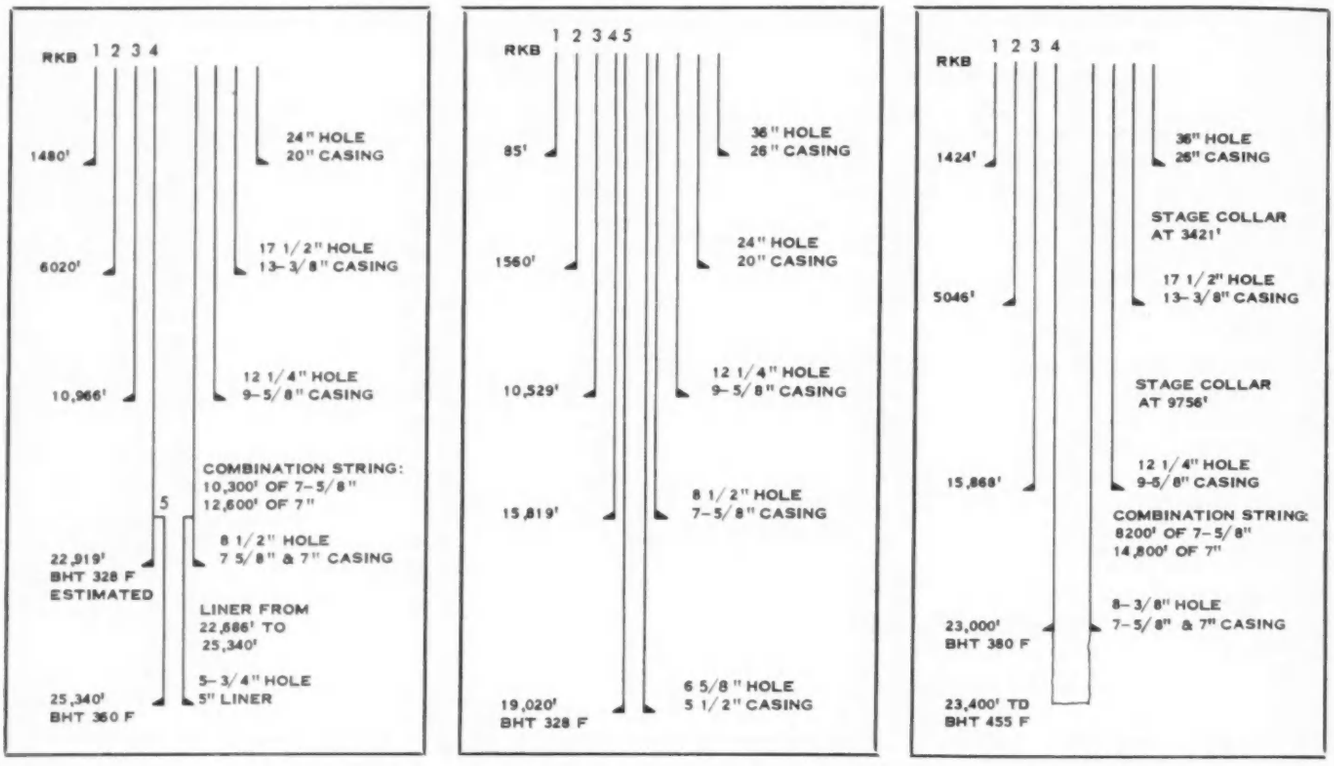

FIGURE 1—Casing strings and primary cementing data for the three deep tests drilled by Phillips Petroleum Co. in Pecos Co., Texas.

CEMENT AND DISPLACEMENT

1. A total of 200 sacks of regular cement with 4 percent bentonite plus 200 sacks of regular cement, a displacement of 528 barrels.

2. A total of 1,685 sacks of regular cement with 40 percent density controlling material and 4 percent calcium chloride at 10.9 pounds per gallon plus 200 sacks of cement at 15.5 ppg, a displacement of 906 barrels.

3. A total of 950 sacks of regular cement with 40 percent density controlling material at 10.8 ppg plus 300 sacks of slow set cement at 16 ppg. This slurry was displaced through perforation at 10,888-90 feet, a displacement of 625 barrels.

4. A total of 1,147 sacks of slow set cement with 40 percent density controlling material and 1.5 percent low water loss material at a slurry weight of 10.8 ppg plus 100 sacks of slow set cement with 1.5 percent LWL material at 15.8 ppg, a displacement of 951 barrels.

5. A total of 136 sacks of slow set cement with 20 percent density controlling material and 3 percent LWL at 12.3 ppg, a displacement of 205 barrels.

1. A total of 400 sacks of regular cement with 1 percent calcium chloride.

2. A total of 2,000 sacks of regular cement, a displacement of 557 barrels.

3. A total of 1,500 sacks of regular cement with 60 percent density controlling material at 10.5 ppg plus 300 sacks of slow set cement at 15.8 ppg, a displacement of 780 barrels.

4. A total of 1,219 sacks of slow set cement with 60 pounds of barite added per sack and 5 percent LWL material at 17.5 ppg, a displacement of 726 barrels.

5. A total of 400 sacks of slow set cement with 10 percent density controlling material and 1 percent low water loss material at 13.6 ppg, a displacement of 427 barrels.

1. A total of 1,662 sacks of regular cement with 4 percent bentonite at 14 ppg plus 300 sacks of regulat at 16 ppg, a displacement of 508 barrels.
2. Top stage: A total of 1,109 sacks of cement with 40 percent density controlling material and 4 percent calcium chloride at 10.8 ppg plus 100 sacks of regular cement at 15.4 ppg, a displacement of 520 barrels.
Bottom stage: A total of 302 sacks of regular cement with 40 percent density controlling material and 4 percent calcium chloride at 10.8 ppg plus 400 sacks of regular cement at 15.4 ppg, a displacement of 768 barrels.
3. Top stage: A total of 1,050 sacks of regular cement with 40 percent density controlling material at 10/8 gallons plus 300 sacks of slow set cement, a displacement of 754 barrels.
Bottom stage: A total of 1,700 sacks of regular cement and 40 percent density controlling material and 0.75 percent low water loss material (LWL) at 10.8 ppg plus 364 sacks of slow set cement, a displacement of 1,226 barrels.
4. A total of 1,099 sacks of slow set material with 16 percent density controlling material and 2.5 percent LWL material at 12.7 ppg plus 150 sacks of slow set with 0.5 percent LWL material at 16.3 ppg, a displacement of 898 barrels.

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was then drilled to 10,529 feet where a string of 9⅝-inch casing was set. The 20-inch surface casing had been set to allow for the possible necessity of running 13⅜-inch intermediate casing on this wildcat well. The results of further drilling has proved this tentative casing string would not be required. At the time 9⅝-inch casing was set, the drilling mud weight was 10.4 pounds per gallon. Inasmuch as it was desired to place cement behind the entire casing string and some danger of lost circulation was known to exist, a 10.5 pound-per-gallon cement slurry was used. The blend consisted of 1,500 sacks of regular portland cement with 84,600 pounds of

low water loss material (LWC) which is equivalent to 60 percent by weight of the portland cement. When mixed, this blend produced approximately 8,250 cubic feet of 10.5 ppg cement slurry. This lightweight slurry was followed with 300 sacks of slow-set cement for additional strength around the bottom joints of the casing. The cement was displaced with 780 barrels of mud with a maximum displacement pressure of 800 psi. Although circulation was lost during the last 30 barrels of displacement, contaminated cement was circulated and hard cement was found 50 feet from the surface.

An 8½-inch hole was drilled to 15,863 feet where it became necessary to set a protective string of 7⅝-inch casing. This string of casing was required because the Harral A No. 1 had suddenly started behaving like a misplaced Gulf Coast well. From the condition of lightweight mud and cement requirements at the 9⅝-inch casing point, increased mud weights were necessary as drilling progressed. A blowout occurred at 14,589 feet which required 18.2-ppg mud to bring under control. Further drilling to the 7⅝-inch casing point required 17.5-ppg mud which was normally gas weight which would break down the formation. In fact, it is believed there was an overlap, in that certain zones were breaking down at the same time others were unloading into the well bore. The 7⅝-inch casing was set to contain the high-pressure gas zones which were encountered and to allow the mud weight to be decreased to combat the lost-circulation problem.

The estimated temperature at 16,000 feet in the Harral A No. 1 was similar to that of the average Gulf Coast well. This temperature was 280° F. at 16,000 feet extrapolated from logged temperatures at shallower depths. This logged temperature would correspond to a circulating temperature of 244° F. and a bottom-hole static temperature of 320° F. The cement blend recommended for this string of casing was slow-set cement with 60 pounds of barite per sack and 0.5 percent LWL material slurried to 17.5 ppg. Laboratory tests showed this slurry to have a thickening time in excess of 4 hours and a 24-hour compressive strength greater than 1,500 psi. Although 40 pounds of barite per sack of cement would normally be recommended to obtain a 17.5-ppg slurry, the exact density requirements for this job were not known and the slurry containing the larger amount of barite could be controlled over a wider range of densities without causing separation of the solid particles from the slurry. The 7⅝-inch casing was set at 15,819 feet and cemented with the recommended cement blend. Only partial returns were obtained during circulation after landing the casing and while mixing and displacing the cement. However, a temperature survey located the top of the cement at 9,905 feet inside the 9⅝-inch casing.

Hesitation pumping allows the use of larger volumes of cement without the danger of premature hydration at the perforations

The Harral A No. 1 was bottomed at 19,020 feet. The logged temperature at total depth was 296° F., which corresponds to a circulating temperature of 260° F., and a static temperature of 328° F. A full string of 5½-inch casing was set to total depth and cemented with 400 sacks of slow-set cement with 10 percent density controlling material and 1 percent LWL material slurried to 13.6 ppg. The mud weight at this time was 13.3 ppg. This was the only cement job out of the 14 primary cement jobs performed on the three wells which required remedial squeezing. Although the top of the cement outside the 5½-inch casing was located at 12,040 feet by temperature survey, pressure developed in the annulus and a small gas flow indicated that channeling of the cement had occurred. The small clearance between the 5½-inch casing and 6⅝-inch open hole over a 3,200 feet interval is believed to be the primary cause of this cementing failure. Remedial squeezes in three separate intervals were performed before production tests were begun in the well. A low-water-loss cement was used on each job. Each squeeze job was performed through a drillable retainer and was successful on the first attempt. Surface connections and cement discharge lines were tested to 13,000 pounds before each job. In each case, the desired squeeze pressure of 8,000 psi was obtained at the surface and the excess cement reversed out without difficulty.

University EE No. 1. The surface string consisted of 1,480 feet of 20-inch casing run in 24-inch hole. The casing was cemented with 2,000 sacks of regular portland cement with 4 percent bentonite and followed with 200 sacks of portland cement with 40 percent density controlling material and 4 percent calcium chloride mixed to 10.9 ppg. The light-weight slurry was followed with 200 sacks of regular portland cement slurried to 15.5 ppg. Circulation was lost when displacement of the cement was started after releasing the top plug, and no returns had been experienced at approximately 6,000 feet with 9.8-ppg mud while reaming the hole at this depth.

Drilling was continued in 12¼-inch hole to a depth of 10,996 feet where an intermediate string of 9⅝-inch casing was set. While running this casing, the floating equipment, consisting of two differential fill collars, plugged and circulation could not be established after the casing was landed. The casing was then perforated from 10,888 to 10,890 feet with 8 holes and cemented through these holes with 950 sacks of regular portland cement with 40 percent density controlling material mixed to 10.8 ppg., followed with 300 sacks of neat slow-set cement. Approximately 300 cubic feet of cement slurry was lost to the formation during displacement. The top of the cement outside the 9⅝-inch casing was located at 8,130 feet by temperature survey. As this cement top was only a few feet above a zone of interest for future production tests, it was desired to re-cement at this point. The casing was perforated from 8,088 feet to 8,090 feet with 8 holes, and attempts were made to establish circulation back to the surface. Circulation could not be established, and the perforations were

squeezed with 200 sacks of slow-set cement mixed with water containing radioactive iodine. A gamma-ray log located radio-active cement from 8,065 to 8,127 feet after the cement in the casing was drilled out and the perforations tested. The floating equipment was then drilled out, and a bridge plug was set a few feet below the bottom of the 9⅝-inch casing. Before running 9⅝-inch casing, an 8½-inch reduced hole had been drilled to 11,556 feet. Circulation was established around the bottom three uncemented lengths of casing by setting a retrievable packer below the perforations 10,888 to 10,890 feet and pumping mud below the packer, around the bottom of the casing and back into the casing through these perforations. A drillable retainer was set at 10,920 feet and the bottom joints of casing were then cemented with 100 sacks of slow-set cement. No squeeze pressure was applied. Cement was found in the casing at 10,885 feet and the perforations were tested satisfactorily before drilling the retainer.

Drilling operations continued on the University EE No. 1 until May 26, 1958, at which time the well surpassed the existing depth record of 22,570 feet. When a depth of 22,919 feet was reached, a protection string consisting of approximately 10,300 feet of 7⅝-inch and 12,600 feet of 7-inch casing was set and cemented. This cement job was the deepest ever performed up to that time. The casing was cemented with 1,147 sacks of slow-set cement with 40 percent density controlling material and 1.5 percent LWL material slurried to 10.8 ppg. This lightweight slurry was followed with 100 sacks of slow-set cement containing 1.5 percent LWL material and slurried to 15.8 ppg. At the time of running this string of casing, the mud weight was 10.2 ppg, the Marsh funnel viscosity was 51 seconds and the water loss was 4.4 cc. Thickening times for the cement blends selected were determined in the laboratory before the job was performed. From a logged bottom-hole temperature of 295° F., which was recorded 8 hours after circulation was stopped, the bottom-hole circulating and static temperature were assumed to be 260° F. and 328° F, respectively. Thickening times were determined using these temperatures and an assumed bottom-hole pressure of 16,000 psi. Under these conditions thickening times of 5 hours for the lightweight slurry and 4 hours 30 minutes for the neat cement were obtained. It should be pointed out that the tests on the neat cement slurry were run with only 0.5 percent density controlling material LWL mixed to 16.3 ppg. However, the subsequent use of 1.5 percent LWL material in the neat cement had no detrimental effects. The slurry could not be mixed above 15.8 ppg because of the high concentration of LWL material, but attained the desired strength upon setting as evidenced by the hard cement found in the bottom joints of casing when the floating equipment was drilled out. The top of the cement was located at 4,100 feet by temperature survey. This 18,819-foot column of cement is believed to be the longest ever placed in a single stage.

Prior to the previously described cement job, specially manifolded storage tanks, which are normally used for hydraulic fracturing, were placed on location, and 10.2-ppg mud was stored in these calibrated tanks. The volume of mud necessary to displace the cement was calculated, taking into consideration a compressibility factor for the mud to be used. The cementing trucks were manifolded to these storage tanks so that the desired number of pumps could continue to displace the cement as soon as the entire volume had been mixed. This procedure made it possible to accurately control the displacement rate and eliminate the necessity for each operator to attempt to keep accurate measurements while switching tanks on his individual pump truck. The amount of mud that had been pumped was known at all times while the cement was being displaced. A total volume of 951 barrels was required to displace the cement and bump the plug which followed the cement.

Drilling continued on this well until a depth of 25,340 feet was reached. At this point, a 5-inch liner was run and cemented in 5¾-inch hole. The liner was cemented with 136 sacks of slow-set cement mixed with 20 percent density controlling material and 3 percent LWL material slurried to 12.3 ppg which yielded a total slurry volume of 340 cubic feet. Although lost returns were experienced with approximately one-half of the slurry still inside the liner, the cement was displaced without difficulty. A good primary cement job was obtained, and the top of the liner at 22,686 feet was tested satisfactorily. As no further drilling was to be done and the liner was to be perforated near bottom, no neat cement was used around the bottom joints.

Montgomery A No. 1. The first string was 1,424 feet of 20-inch surface casing set in 24-inch hole and cemented with 1,662 sacks of regular portland cement with 4 percent bentonite cement was slurried to 14 ppg and the neat cement slurried to 16 ppg. Cement was circulated to the surface.

A 17½-hole was drilled to 5,046 feet and 13⅜-inch casing set at this depth. As previously mentioned, circulation was lost while cementing the 13⅜-inch casing in the University EE No. 1 well. For this reason, it was decided to cement this string in the Montgomery A No. 1 in two stages. A stage-cementing collar was set at 3,421 feet. The bottom stage was cemented with 302 sacks of regular portland cement with 40 percent density controlling material and 4 percent calcium chloride slurried to 10.8 ppg., followed with 400 sacks of regular portland cement slurried to 15.4 ppg. The stage collar was opened and approximately 170 cubic feet of excess cement circulated out. Circulation was continued for 8 hours. The top stage was then cemented with 1,109 sacks of regular portland cement with 40 percent density controlling material and 4 percent calcium chloride, followed with 100 sacks of regular portland cement. Again, the respective slurry weights were 10.8 and 15.4 ppg. Cement was circulated to the surface on the second stage. No lost returns were experienced on either stage. The neat cement was used on both stages for added strength around the bottom joints of casing and at the stage collar.

A 12¼-inch hole was drilled to 15,868 feet and an 8¾-inch reduced hole to 16,000 feet. The mud weight at the time of running casing was 10.4 ppg. A stage-cementing collar was set at 9,756 feet. The bottom stage was cemented with 1,700 sacks of common portland cement with 40 percent density controlling material and 0.75 percent LWL material slurried to 10.8 ppg, followed with 364 sacks of slow-set cement slurried to 15.4 ppg. The stage collar was opened and approximately 200 cubic feet of excess slurry circulated to the surface. After the ports in the stage collar were

opened, partial lost returns were experienced while circulating out the excess cement. When the lower-stage cement had attained its initial set, the top portion of the casing was cemented through the stage collar with 1,050 sacks of regular portland cement with 40 percent density controlling material, followed with 300 sacks of neat slow-set cement. Cement was circulated to the surface on this top stage.

The last string of casing to be set in the Montgomery A No. 1 was the combination string of 7⅝-inch and 7-inch set at 23,000 feet, which at that time erased the record then held by the University EE No. 1 with a similar tapered string set to 22,919 feet. This well had a considerably higher bottom-hole temperature at 23,000 feet than the University EE had encountered at this depth. The temperatures varied from 347° F. to 372° F. With the selection of 365° F. as an average logged temperature, the bottom-hole circulating temperature was estimated at 344° F. and the static bottom-hole temperature at 380° F.

The original cement recommendation for this job was slow-set cement blended with 16 percent density controlling material and 2 percent LWL material slurried to a density of 12.8 barrels per gallon. This slurry was to be followed with slow-set cement blended with 0.5 percent LWL material and slurried to 16.3 pounds per gallon. When tested with cement and additions available in the laboratory, both slurries had thickening times of 4 hours or greater at the preceding temperature conditions. Separate laboratory tests on an actual sample of the cement which was available for this job disclosed that this shipment of cement did not respond to the thickening-time control of LWL material as did the cement originally tested. Further tests showed it would be necessary to increase the LWL material content to 2.5 percent in the lightweight cement slurry to obtain the desired thickening time.

After the casing was landed, mud was circulated for 12 hours before cementing was commenced. This long period of continuous circulation was considered to be desirable for two reasons. First, it was necessary to circulate the hole for an extended period of time to effectively remove the gas that had entered the well bore while running casing. It is believed that this reduced the chances of channeling of the cement and pressure buildup in the annulus following placement of the cement. Failure to remove all the gas-cut mud from the well bore prior to cementing the 5½-inch casing in the Harral A No. 1 is believed to have been a contributing factor in the pressure buildup between strings which occurred following the cement job. The second reason for the prolonged circulation period was to obtain the maximum cooling effect down-hole before cementing. Any additional cooling that could be obtained was an added safety factor for the successful placement of the cement. Again calibrated tanks containing the pre-determined volume of mud necessary to displace the cement were used.

After the 12-hour circulating period, the casing was cemented with the recommended cement system consisting of 1,099 sacks of the lightweight cement followed with 150 sacks of the neat cement. A temperature survey located the top of the cement outside the 7-inch casing at 15,839 feet or 29 feet in the 9⅝-inch casing. This was just a few feet lower than the calculated cement top prior to the job. If possible, this cement job was an even smoother operation than the similar job on the University EE No. 1.

Drilling continued until the depth of 23,400 feet was reached. Prior to testing the 400-foot open-hole section, two bottom-hole temperatures were obtained with 500° F. maximum thermometers. These temperatures were 438° F. and 472° F. for an average of 455° F. It is believed that the 472° F. reading is the highest temperature ever recorded in a well. Testing in the interval yielded water, and it was desired to squeeze cement the open-hole section. The squeeze job was accomplished through a tapered string of 3½-inch and 2⅞-inch tubing and a permanent production packer set at 22,970 feet. Mud was circulated for 11½ hours at the top of the packer to cool the hole prior to squeezing. The tubing was tested to 10,000 psi and the surface connections to 13,000 psi. The open hole was then squeezed with 79 sacks of slow-set cement blended with 60 pounds of barite per sack of cement and 1.7 percent LWL material by weight of the cement. The total yield was 150 cubic feet of slurry mixed to 16 pounds per gallon. Final squeeze pressure was 8,000 psi at the surface with 114 cubic feet of the slurry below the packer. The seals were pulled from the packer and 6 cubic feet of slurry displaced on the top of the packer.

This article was condensed from a paper "Deep Well Cementing in Pecos County, Texas" presented before the spring meeting of the Southwestern District Division of Production, API, Midland, March, 1959. The authors wish to express their appreciation to Phillips Petroleum Company and to Halliburton Oil Well Cementing Company for permission to publish this paper. Acknowledgment and appreciation are also expressed to Dr. F. J. Shell of Phillips Petroleum Company, under whose direction the cement blends were formulated and tested, and to Frank M. Sage and T. D. Pugh of Halliburton Oil Well Cementing Company, who assisted in the accumulation of data and final preparation of this paper. **—The End**

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Fulton

J. O. Woodson received his B.S. degree in mechanical engineering from the University of Tennessee in 1948. Following graduation he was employed by Phillips Petroleum Company in Bartlesville as a mechanical design engineer. He served in this capacity for two years. He was then assigned as a staff engineer in various production districts during 1950-56, including two years in Minden, La., and three years in Alvin, Texas. He was promoted to district engineer for Phillips in Odessa, Texas, in 1956 and then to his present position of division engineer in Midland in 1957.

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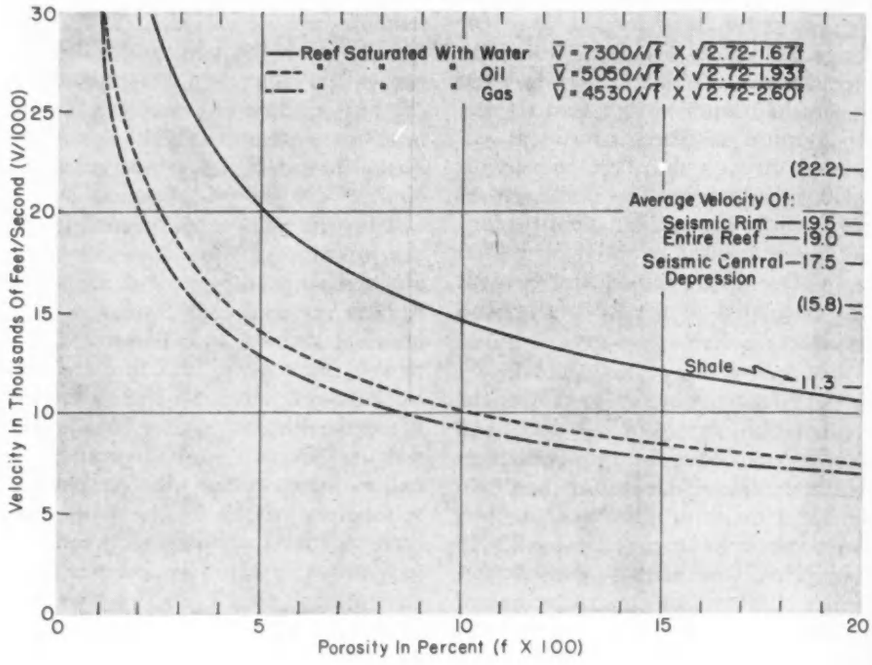

Figure 6—These curves show the seismic velocity in completely gas-, oil- and water-saturated Stamford reef limestone as a function of porosity (based on Brandt's Equation 29).

PART 2

Seismic velocity effects may hide organic reefs

The approximate magnitude of velocity contrasts and false seismic structures produced by little known limestone bodies can be estimated with a moderate amount of geologic data

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THE AMOUNT OF false seismic structure to be expected from a little-known or hypothetical limestone reef can be estimated, and the estimate used to predict how well the reef will show up on seismic maps as a false "high" on horizons below the reef. Such information might be used to forecast the effectiveness of seismic exploration. Also it might later be used with seismic data to interpret the shape of the limestone body and the attitude of reflecting horizons masked beneath it. The chief physical uncertainty in an estimate of false seismic structure is the wave velocity in the limestone since velocity varies with changes in the lithologic and interstitial fluid properties of the rock.

Estimations of the magnitude of velocity contrast and any false seismic structure indicated by a hypothetical or little-known reef might be used to predict the effectiveness of seismic exploration in the area. Also, the estimate could be compared with actual seismic results for purposes of interpretation or used to interpret the actual attitude of reflectors masked by velocity effects in the overlying beds.

EFFECT OF CHANGES IN LITHOLOGIC AND FLUID PROPERTIES

Brandt's[8] Equation 29 was used to evaluate theoretically the effect on seismic velocity of hypothetical changes in the lithologic and fluid properties that control it. The effect of changing a single property at a time—percent pore space, limestone to dolomite and complete saturation with representative water, oil and gas—is shown on Figures 5 and 6. The effect of changes in depth of burial on representative combinations of these factors is given

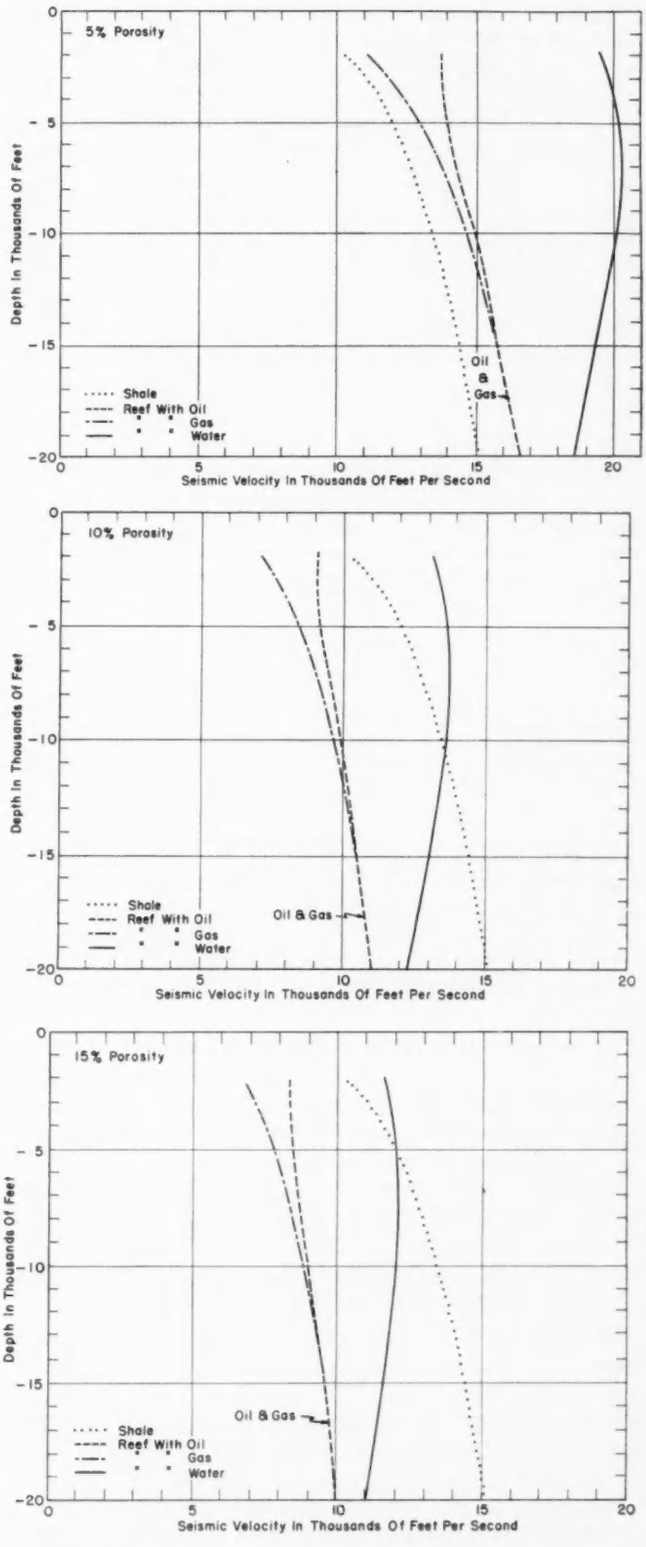
as Figures 7 through 10. The results of combining single-property changes are determined by time-averaging, in a form like Equation 1, (Part 1).

The criterion for concealment of the Stamford reef is the condition that velocity in the seismic central depression (where reservoir properties are best) is about the same as in the enclosing shale. This would reduce the seismic appearance of the reef to a group of small irregularities somewhat less prominent than many others in the same area that have been drilled with no greater success than locations selected at random.[29] With material presented here one can determine the velocity effects of various hypothetical changes and see what it does take to fade the Stamford reef into the background. Considering limitations on accuracy, the same figures should apply approximately to reefs in general. In the more general cases due consideration must be given, of course, to limestone thickness and to lateral changes in all properties.

This information and the available geologic data on a little-known or a suspected organic reef may be used to estimate how much false velocity "structure" the reef should produce within a reasonable range of assumed conditions. A rough model of the reef might be prepared to compare with actual seismic results for purposes of interpretation. The question of how much velocity contrast is required to make a reflection off the top of a reef was not investigated specifically because other effects also are significant, although reflections in the earth arise principally from vertical changes in velocity.[30] The mere existence of a velocity contrast is no guarantee that useable reflections actually will occur. It is the author's impression that reefs comparable to the one at Stamford, encountered at greater depths farther west, generally yield poor reflections below about 5,000 feet and no useable reflections below a maximum of 10,000 feet in depth.

The same approach might be used also to remove somewhat the masking effect that lateral velocity changes (due to reef limestone and other causes) have on the attitude of reflecting horizons beneath. Velocity data may be obtained directly from measurements in wells, or estimated from them (by computations like those used in this paper, or by comparing seismic time and logged thickness where the reflecting surfaces are recognizable on well logs). Also, they may be determined from surface measurements.[7] This approach would have to be modified considerably where refraction and diffraction have significant effects (as with some South Texas faults).[22]

The effect of extreme changes in a single important property will be considered first, beginning with lithologic changes. Curve 2 of Figure 5, (Part 1) shows that the seismic velocity of the central seismic depression in the Stamford reef would be reduced to 11,300 fps, the same as the enclosing shale, if limestone porosity were increased from its average value of 6.7 percent to 17 percent. If dolomite replaced the limestone molecule-for-molecule, and no further compaction took place, average porosity would rise from 6.7 percent to 17.6 percent (and grain density would go up from 2.72 to 2.83) yielding a seismic velocity of 10,950 fps. However, for the *same porosity* (and fluid content) the substitution of dolomite for limestone merely reduces velocity about 2 percent, which is negligible. However, dolomitization perhaps *is* important



FIGURES 7, 8, 9—Here, seismic velocity in Stamford reef limestone is shown as a function of depth of burial for 5 percent (Figure 7, top), 10 percent (Figure 8, center) and 15 percent (Figure 9, bottom) porosity saturated completely with representative gas, oil and water. Estimated shale velocity is shown for comparison in each figure.

since porosity may be increased significantly at times through replacement of calcite by dolomite.

If, instead, only the interstitial fluid in the Stamford reef were changed by gas replacing *all* the water, the velocity in the central seismic depression again would be

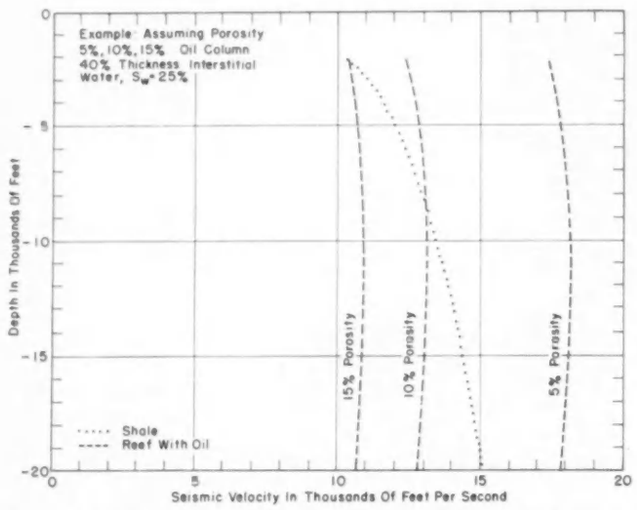


FIGURE 10—Here is the velocity-depth relation for limestone containing an oil column through 40 percent of its thickness, with 25 percent interstitial water, for representative porosity values.

only 10,950 fps. If pore spaces were occupied by oil alone (39 gravity and GOR 240:1, from DST of Sojourner #1 H. L. Robertson), seismic velocity would be about 12,100 fps. Figure 6 shows velocity in completely gas- and oil-saturated limestone (at the pressure and temperature in the center of the Stamford reef as previously estimated) as a function of porosity.

Due allowance must be made for the higher velocity in the capillary water which occupies part of the pore space with the gas and oil. This can be done reasonably with a time-average formula similar to Equation (1):

$$\frac{1}{\overline{V}} = \frac{\text{Thk. below O/W} + (S_w \times \text{thk. above O/W})}{V_{water}} + \frac{(1 - S_w)\ \text{thk. oil}}{V_{oil}} + \frac{(1 - S_w)\ \text{thk. gas}}{V_{gas}} \qquad (3)$$

where: $\overline{V}$ = average velocity.

$V_{subscript}$ = velocity values for 100% saturation with the fluid named, from Figures 5 and 6.

Thk. = thickness of the column (of water, oil and gas respectively) as a fraction of the total thickness of the limestone body at that point.

O/W = oil/water contact.

S_w = average capillary water saturation ("irreducible" interstitial water or "connate" water).

For example, if porosity of the Stamford reef were 8 percent, if one-third the thickness of limestone were entirely filled with water, the next third held oil and the upper third gas, both with 30 percent water saturation, average velocity would be 13,000 fps.

$$\frac{1}{\overline{V}} = \frac{0.33 + (0.3 \times 0.67)}{16{,}000} + \frac{0.7 \times 0.33}{11{,}000} + \frac{0.7 \times 0.33}{10{,}500} = \frac{1}{13{,}000}$$

One-way travel time through 1,000 feet of reef limestone would be 1/13 sec, and through the corresponding shale 1/11.3 sec; the wave passing through limestone would gain the difference, 1/86.5 sec. This is equivalent to the shale wave not having to pass through the last 130 feet of shale, and is the amount of false seismic relief that would be produced by such a limestone body replacing shale (like that near Stamford).

Increasing the depth to a reef would increase seismic velocity in the enclosing shale much faster than any increase in the limestone, thereby reducing the velocity contrast and making the feature more difficult to find. This is shown on Figures 7 through 10. Figures 7-9 show velocity as a function of depth for porosity of 5, 10 and 15 percent respectively, completely saturated with gas, oil, and water. Figure 10 combines data from the previous figures (by time-averaging with Equation 3) to depict the velocity-depth relation of limestone containing an oil column through 40% of its thickness, with interstitial water saturation averaging 25%, for each of the three porosity values. In preparing the figures, due allowance was made for the normal increase in fluid and rock-frame pressures with depth and for changes in fluid density and compressibility with pressure, temperature and gas saturation (solubility). It was assumed that at surface conditions the water contained 75,000 ppm NaCl, oil gravity was 40 degrees and free gas was 0.85 gravity. Oil and water were considered to be fully saturated with gas in the subsurface at all times. Appendix I describes computations and sources of data.

Figures 7 through 10 also show velocity in shale (like that about Stamford reef) as a function of depth, based on observations that velocity in shale increases as the one-sixth power of depth.[12] This observation is supported theoretically and experimentally by others.[31] Also, it has been demonstrated that it can be explained simply by reduction of pore space through compaction.[32]

The reduction of pore space in limestone by compaction accompanying increased depth of burial is believed to be relatively small, but could not be estimated; therefore it was ignored, so that porosity values shown on the charts are those that might actually be measured in place by logging. However, it has been demonstrated that long-time stress does compact sandstone, and limestone should be affected similarly.[25] (The *elastic* effect of changes in pressure might be used to determine how raising a core to the surface changes its porosity, but it does not indicate the amount of geologic compaction, which involves permanent deformation.[11, 15])

EFFECT OF ABNORMAL SUBSURFACE PRESSURES

Normal pressure gradients were assumed for computations of wave velocity as a function of depth to cover the more general situation. At any point in the subsurface total vertical pressure is made up of two components, that in the rock frame and that in the interstitial fluid. The *normal* (gage) pressure in the fluid is equal to the weight of a continuous column of ground water extending from measurement depth to the surface water table. The pressure (vertical stress) in the rock frame in a tectonically relaxed area is equal to the weight per unit area of the overlying rock with due allowance for pore space, less the buoying effect of the water which the rock displaces. The sum of the two is the total vertical pressure, equal to the weight of the entire overburden (water and rock) per unit area, and therefore is referred to as the overburden pressure. Its value approximates one psi per foot of depth.[18]

The *normal* fluid pressure on the Texas Gulf Coast, for example, almost always lies within a very few percent of 0.465 psi per foot of depth, which corresponds to ground water averaging about 100,000 ppm salt. The difference is rock matrix pressure, which can be determined only in this indirect manner. It is sometimes termed compaction pressure because it is the pressure responsible for compaction of sediments.

Numerous measurements of rock density (or grain density and porosity) and subsurface fluid pressure demonstrate that the latter frequently approximates normal. However, departures from the norm are common and important. The Stamford reef has "abnormally" low fluid pressure, a situation that seems to be widespread beneath the Western Interior Plains. "Abnormally" high fluid pressures, which approach 9/10ths of the overburden pressure, are common along the Texas and Louisiana Gulf Coast in permeable sandstone beds isolated in the upper part of a thick shale facies.[6] These departures from normal may have important direct and indirect effects on velocity.

Fluid pressure P_f appears three times in Equation (2), and modifies the bulk modulus of the fluid, B_f. A marked increase in fluid pressure (at constant overburden pressure P) decreases wave velocity. As noted below, the shale participates in the phenomenon responsible for "abnormally" high fluid pressures so its velocity is reduced along with that of the reservoir-type rocks. The net effect is likely to be some change in velocity contrast, the amount of change depending on specific circumstances.

Another effect which cannot be evaluated properly by the numbers that must at times alter still more any seismic velocity contrast in high-pressure sections is the relation between pressure, compaction and porosity, the last being an important term in Equation (2).

Compaction is essentially a reduction in pore space. Since the eliminated voids were occupied by fluid, the rate at which the less permeable sediments can compact must be limited by the rate at which the fluid can escape. The "abnormally" high fluid pressures build up where water is not able to get out as rapidly as required for normal compaction at the particular depth (see Dickinson 1953); and porosity remains correspondingly high, necessarily in the shale as well as in the more permeable beds where it is commonly observed. Where "abnormally" high fluid pressures occur the porosity of deeply-buried reef limestone might be maintained at an unexpectedly generous value (as is doubtless the case with some very deep producing oil sands). It follows that the shale velocity with which any such limestone should be compared ought to approximate the value at the depth where rock matrix (compaction) pressure normally would equal that actually occurring in the high pressure zone.

Although the problem is hypothetical, and the treatment theoretical, it does look like productive limestone reefs in abnormally high fluid-pressure sections, which are almost necessarily deep, might be exceptionally difficult to find with the seismograph. Conversely, abnormally low fluid pressures may aid exploration. It should be noted that, in using the wave velocity in the shale surrounding the Stamford reef as a base value for that lithology, no allowance has been made for the slight accelerating effect of lower-than-normal fluid pressures in that area.

EFFECT OF ANISOTROPY OF THE MEDIUM SEISMIC VELOCITY

Rocks in the earth transmit sound at significantly different velocities in different directions. Differences along the bedding and perpendicular to it have been measured in the field.[28,31] This and other anisotropic phenomena are to be expected from theoretical considerations and reported laboratory work.

Anisotropy in limestone must result in part from the substantial difference in wave velocity along the several crystal axes in calcite coupled with an almost invariably preferred orientation of the crystals in limestone. Investigators have measured wave velocities along different (unspecified) crystal axes of calcite and found a marked difference.[32] Values determined were 23,060 fps, 21,570 fps and 15,740 fps, with measurements "usually accurate to about 1%." Consequently, limestones whose particles (whether crystals or fragments) have a preferred crystallographic orientation also must be anisotropic to sound. In limestones it has been found that the c axes of calcite crystals invariably lie in the plane of the bedding, though within this plane they are oriented almost at random.[17,24] In dolomites, mineral crystals sometimes are oriented about at random; "almost always" according to one investigator,[17] although four of his six petrofabric diagrams of dolomite show a noticeable tendency toward orientation like that of limestone. These authors attribute the fabric to the usual vertical direction of the greatest principal stress in the rock frame.

Also, it is conceivable that shells of organisms which secrete lime with a preferred orientation might be preserved in such a way as to maintain this bias—perhaps by reef frame-building organisms remaining in growth position or by transported remains becoming oriented by shape. Oriented organic remains might cause changes in seismic velocity patterned after sedimentary facies, like the seismic atoll-shape of the Stamford reef.

It has been demonstrated experimentally that elastic wave velocity through rocks subjected to uniaxial compression, which approximates the stress distribution in tectonically relaxed areas, is about 10 percent greater in a direction parallel to the compression than perpendicular to it.[26] On a more fundamental level it was found that stress distribution modified the elastic properties of rock, which in turn are a principal determinant of wave velocity.[14] Also, distribution of open spaces, whether uniformly distributed over approximately horizontal beds or concentrated along sub-parallel vertical fractures, may be important in some cases. These directional phenomena are not taken into account in the preceding computations, which must certainly lead to some error in the velocities as estimated.

The accuracy and usefulness of the present work would be enhanced especially by experimental confirmation of the Brandt equation from well measurements or geologically realistic laboratory experiments, by applying these concepts to a reef from which direct velocity measurements are obtained, by investigation of anisotropic phenomena and by correlating velocity contrast and other factors with reflection quality over a number of organic reefs (and other limestone bodies.)

Concepts applied herein to lateral velocity changes caused by organic reef limestone also seem applicable to changes produced by some other geologic phenomena.

APPENDIX 1—HOW RESERVOIR FLUID PROPERTIES WERE ESTIMATED

As depth of burial increases, four factors in the Brandt equation change correspondingly—the pressures, fluid density and bulk modulus, and porosity. The last, a function of compaction, was ignored in the limestone for practical reasons and for lack of satisfactory figures on the (non-elastic) deformation of comparable material. Consequently, the porosity shown is that of

the formation in place—the value measured down the hole by logging without any allowance for compaction of a particular reef limestone subjected to the conditions of progressively greater depths. The effect of increased matrix density by compression is relatively small and was ignored.

Subsurface pressures were computed on the basis of a gradient due to the total weight of the overburden of approximately 1 psi per foot of depth, and a gradient in the ground water of about 0.465 psi per foot of depth. The validity of this overburden pressure gradient has been demonstrated.[18] The ground water gradient of 0.465 psi per foot is that normally encountered along the Texas Gulf Coast, and is equivalent to the pressure due to the weight of a column of water with average salt concentration of about 100,000 ppm. Pressure gradients actually encountered often vary considerably from the norm (e.g., the Stamford reef itself), but it seemed preferable to use normal pressures so that the results would be of more general application. A temperature gradient of 1.6° F. per 100 foot depth from a base of 74° F. was used.

The fluid density and bulk modulus are closely related. For water, assumed to be saturated with natural gas, the bulk modulus was computed from charts showing solubility of gas in water as a function of temperature, pressure and brine concentration; and compressibility (of which the bulk modulus is the reciprocal) as a function of temperature, pressure, and solution gas-water ratio.[4, 8] These (and other) charts were extrapolated to higher values by assuming that trends indicated on the charts continued beyond them. Such extrapolation was not done with great accuracy because the effect of small errors on the computations seemed insignificant. Allowance was made for the slight increase in water density due to compressibility at high pressures, but no allowance was made for any expansion of the water due to gas in solution; it might well have been better to ignore both effects on the assumption that they compensate for each other.

Free gas, as in a gas cap or a non-associated gas reservoir, was assumed to have a gravity of 0.85 (air = 1) at standard temperature (60° F.) and pressure (14.65 psi). The pseudo-critical temperature and pressure for gas of this gravity was estimated from a chart and these were converted to the pseudo-reduced values.[4] The pseudo-reduced temperature and pressure were used to determine the gas deviation factor Z, and this employed with the general gas law to compute equivalent liquid density (water = 1) of the reservoir gas, using a density conversion factor of 834. Isothermal compressibility as a function of the pseudo-reduced properties also was read from a chart.[27] However, compression and rarefaction accompanying transmittal of sound is adiabatic, decreasing the compressibility by the ratio: specific heat at constant pressure/same at constant volume. This ratio has a value of 1.40 for most gases within the applicable temperature range.[10] Therefore, the bulk modulus was multiplied by 1.40.

The oil was assumed to have a gravity of 40° API at the surface, and to be completely saturated with gas in the reservoir. Gas solubility and density (at standard temperature and pressure) as functions of pressure were estimated from correlation charts.[21] The density of gas-free 40° oil was computed; and the apparent density contributed by the solution gas (in the same units of volume using 1 barrel = 5.615 cubic feet) was added. The sum was divided by the reservoir volume factor to yield the reservoir density of the oil when expanded by solution gas.[2] Compressibility was estimated as a function of density.[4] Below about 15,000 feet the density and bulk modulus of the oil and gas turned out to be identical, as would be expected, which tends to confirm the accuracy of the correlations employed.

The computations just described assume that the limestone is 100% saturated with the particular fluid, which is not the actual case with hydrocarbons. The effect of combined water, oil and gas columns, and of interstitial water in the last two, is introduced by time-averaging with Equation (3).

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ACKNOWLEDGMENTS

The writer is grateful to many persons for making possible this paper and its predecessor describing the Stamford reef. Dr. Richard A. Geyer encouraged him to complete this study, examined the manuscript and suggested some improvements. Dr. L. Y. Faust and others also looked over the manuscript and made constructive suggestions, especially about the desirability of confirming experimentally Brandt's formula and applying these concepts to some reef for which direct measurements of velocity are available. The writer's wife, Beverly, kindly drafted the charts. Pan American Petroleum Corporation gave permission to publish.

IN A GRAVITY SURVEY, it is important to know if stations are placed on river fill, or near bedrock on top of hills. In **seismic exploration,** surface geology should often be noted. An area where topography is dominated by a dip slope covered with gravel is a good example. Small streams cut the gravel, exposing shale. The shale drills easier and furnishes shotpoints that yield good records, contrasted with hard drilling and poor records in gravel terrain. In such an area, fewer, well-placed shotpoints give better results at less cost.

In another case, shot holes were drilled in a hard sandstone atop a ridge. Poor records were obtained. A second line of shot holes, parallel to the first and about 1,000 feet away, bottomed in shale. Good records resulted from this maneuver. Obviously geology should have been used earlier.

Geology is also useful in making locations for magnetic stations, because exposed granite or burnt out clinker may be avoided.

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Plastics reduce sand problems along the Gulf Coast

Applicable to both oil and gas wells, "squeeze" technique is 85 percent successful in controlling unconsolidated formations

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SAND CONSOLIDATION plastic has proven to be an effective remedy for unconsolidated sand problems in the Gulf Coast area. Most application difficulties have been eliminated and, for the type of treatments described in this article, the success ratio has been obtained by observing proper precautions during well perforating operations.

The use of plastics for sand control provides the following advantages.

- Sand is retained in place, not merely blocked at the well bore.
- Since the sand does not move, there is little danger of erosion by fine particles.
- The hole is left clear and unobstructed.
- Application technique is relatively simple.
- In many cases, plastic can be applied without moving in a rig, resulting in a more economical workover.
- Remedial work (such as zone abandonment or ratio control) is easier to accomplish following sand consolidation plastic work.
- In case it becomes necessary to repair a faulty primary sand control job, sand consolidation plastics can be applied easily, as a secondary remedial procedure.

Sand production from unconsolidated formations long has been a serious problem in Gulf Coast Oil and gas wells.[1,2,3] Improvements in materials and application techniques, since the inception of this method more than 10 years ago, have greatly increased the success ratio of such treatments. The ease of application, and the long life of the resulting consolidated sand-plastic network, make the method economically desirable. Some Gulf Coast operators now regard it as a standard part of completion procedure, rather than an emergency remedial method for use after production difficulties have been encountered.

FIGURE 1—These photomicrographs (20X) show untreated unconsolidated sand (left) and the same sand following consolidation with plastic (right).

Sand control methods. Sand production usually results from failure of natural cementing materials in the formation, which normally hold individual sand grains together. Such failure may be due to dissolving action of water (the problem usually is most severe in wells making considerable amounts of brine), to mechanical breakdown resulting from impingement by flowing formation fluids or the effect of pressure differentials near the well bore.

Many sand control methods have been devised to retain loose sands, and to protect pumps, valves and fittings from being "cut out" by the loose, produced sand. Most of these methods endeavor to set up an artificial barrier around the well bore, that will be permeable to liquids, but impermeable to solid particles. Thus, sand migrating to the well bore is retained without interfering with production of well fluids. The oldest of these methods is to pack the formation with coarse sand or gravel to hold back the finer formation sands. Slotted or perforated metal screens also have been employed for this purpose. A more

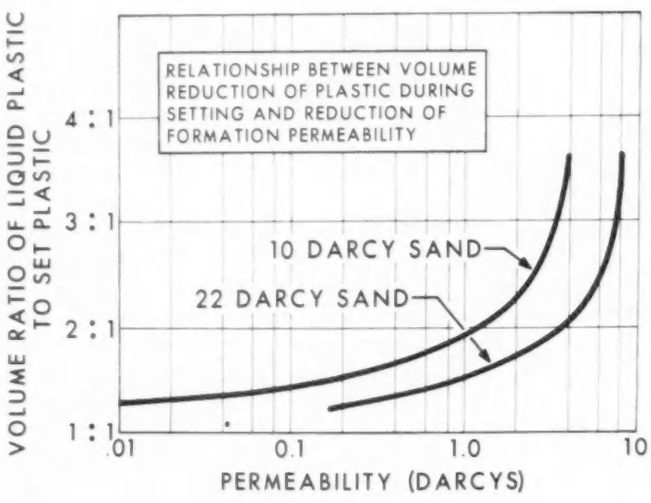
. . . Oil pumped slowly through the plastic before it has attained its consolidation set improves residual formation permeability

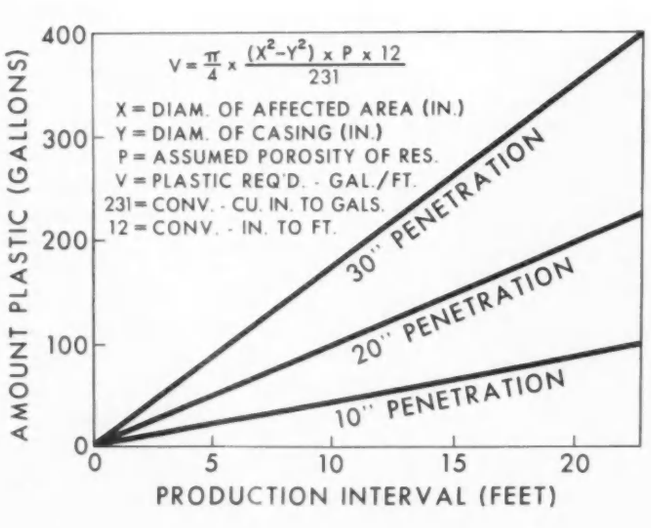
recent method consists of packing the well with unset-plastic-coated sand grains or walnut shells which, upon the setting of the plastic, form a consolidated network that acts as a barrier to loose formation sand. Disadvantages of these methods include the fact that the unconsolidated sand behind the barrier may bridge and pack, reducing flow rates. Also, when extremely fine formation sands are encountered, these may penetrate the barrier and in time "cut out" passages, allowing unhampered sand production and requiring other remedial work.

In contrast, liquid sand consolidation plastics are pumped back into the unconsolidated sand. There the plastic polymerizes and hardens, cementing individual sand grains together into a rigid mass, yet preserving residual permeability for unobstructed production of well fluids. The use of sand consolidation plastics requires no permanent down-hole equipment. The sand is retained in place in the formation and the success of the job does not depend upon the efficiency of a screening barrier. Sand consolidation plastics are chemically inert and are unaffected by water, oil or gas.

Sand consolidation plastic. The plastic used in sand consolidation treatments is of the thermosetting type.[4,5,6,7] It is introduced into the well in liquid form, consisting of partially polymerized plastic dissolved in alcohol. Once the plastic is in place, heat from the formation causes the plastic to polymerize into a solid, insoluble mass. During this setting process the alcohol separates out the plastic hardening around the individual sand grains and the rejected solvent filling the interstitial pore spaces. The set plastic occupies only a fraction of the original volume of liquid plastic and alcohol. The remainder of the pore space contains only alcohol which is displaced readily by oil or well fluids. Thus, the permeability of the rock is not destroyed, but remains open to later production. This may be seen in Figure 1, two photomicrographs showing loose sand before and after consolidation with plastic.

During setting, the plastic undergoes three distinct stages. First, the liquid resin gradually thickens until





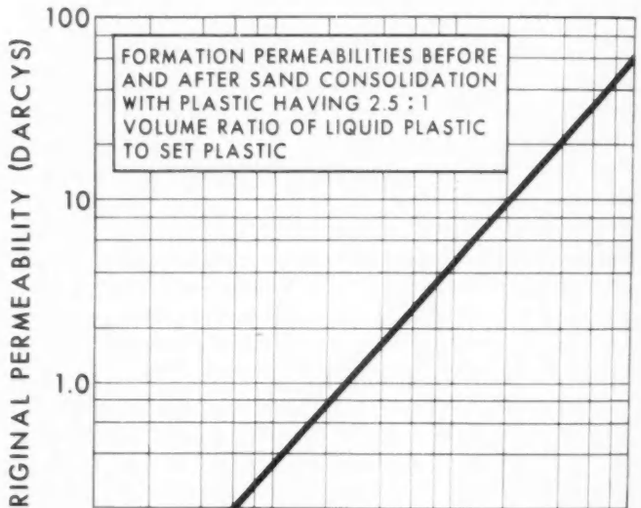


FIGURE 2—(Upper left) These curves compare the permeabilities of sand before and after consolidation, using plastics with different ratios of liquid plastic volumes to set plastic volumes. As can be seen, a reduction in formation permeability is unavoidable. However, because most producing unconsolidated sands have permeabilities measurable in Darcys, permeability reductions of as much as 50 to 80 percent are not of particular consequence.

FIGURE 3—(Above) This figure shows the reduction in permeability following consolidation of various sands with different initial permeabilities, using a plastic havng a 2.5:1 ratio of liquid volume to solid volume. These data were obtained by saturating sand samples with liquil plastic, and measuring the resulting permeability after the plastic had set. The higher the initial permeability, the greater was the percentage of permeability reduction.

FIGURE 4—(left) Here is a method for calculating the amount of plastic required for a consolidation job. Curves show V plus the casing volume of the treated section assuming 30 percent formation porosity.

the "initial set" or "gel point" is attained. The plastic now is in a semi-solid condition and no longer will flow. Following the initial set, the plastic becomes more rigid until the "consolidation set" is attained. The plastic now is hard, but still occupies the original volume of the liquid mixture. During the third stage, the plastic gradually shrinks to its final volume, approximately 30 to 40 percent of the original liquid volume.

The ratio between volumes of unset and set plastic is important as it determines the success of the job. The greater the volume of the final set plastic, the stronger will be the consolidation bond between sand grains. On the other hand, the more shrinkage taking place, the greater will be the residual permeability of the formation following treatment. The volume change the plastic will undergo during setting is controlled by the relative proportions of plastic and alcohol used. This is determined by specific well conditions and is chosen carefully to provide adequate strength for cementing loose sand grains together permanently, yet retain maximum permeability to fluid flow. This relationship is shown in Figure 2 (see Figure 3 also).

The setting time of sand consolidation plastic is related to formation temperature. Control of setting time is desirable so that plastic will not set up before it is properly placed. In cooler wells, extensive shut-in time might be required for a proper "set." By adding suitable catalysts, setting time can be controlled in wells ranging in bottom-hole temperature from 90° to 250° F.

The usual procedure is to add the proper amount of catalyst to provide an initial set in two hours at the specific temperature of the well being treated. This allows sufficient time to displace the liquid plastic completely into the unconsolidated sand section. The time required for the consolidation is set approximately four times that of the initial set, or approximately eight hours after the plastic has been placed in the well. At this time, practically no permeability remains in the formation.

If several zones of different permeability are to be treated, this is the time to apply additional stages of plastic. The first stage naturally will enter the most permeable zone. When it has reached the consolidation set, additional plastic cannot enter this zone but is diverted into other, less permeable zones. After the plastic has reached its consolidation set it begins shrinking and continues until maximum permeability is restored. A plastic with an initial set of two hours usually will reach maximum permeability within 24 hours, or 16 hours after the consolidation set. The amount of sand consolidation plastic needed for a given well can be calculated readily using the formula shown in Figure 4.

TABLE 1—Here are results of sand consolidation treatments with plastic in the West Delta area of South Louisiana. These actual case histories indicate the success of the method.

Well	Perforations	Plastic (Gal.)	Stages	Fluid–BPD	Choke	Water %	Sand
1	8611–16′	200	1	167	10/64	25.	None
2	6775–80′	400	2	274	12/64	0.1	None
3	7351–56′	400	2	Gas well—Shut in			None
4	9022–27′	400	2	290	8/64	0.1	None
5	9282–87′	400	2	293	8/64	0.1	None
6	9539–44′	400	2	260	8/64	0.1	None
7	6508–14′	400	2	123	8/64	...	None
8	9784–89′	400	2	175	6/64	...	None
9	9082–88′	400	2	279	8/64	...	None
10	9384–90′	400	2	350	8/64	...	None
11	6515–22′	400	2	161	8/64	0.1	None
12	9091–96′	400	2	184	10/64	20.	None
13	6564–69′	400	2	133	9/64	0.4	None
14	9818–23′	400	2	Made water—Abandoned			None
15	6556–61′	400	2	161	8/64	0.1	None
16	8715–20′	400	2	176	8/64	0.2	None
17	9106–11′	400	2	300	8/64	0.1	None
18	7942–52′	500	3	Making sand—required workover*			
19	6938–43′	400	2	35	12/64	0.1	None
20	8912–17′	400	2	272	9/64	0.1	None
21	8966–70′	400	2	298	10/64	0.1	None
22	9098–9103′	400	2	224	8/64	0.1	None

* This well was treated with 500 gal. of plastic in three stages and failed to hold. A second treatment employed 2000 lb. 20–40 mesh sand followed by 200 gal. plastic in a single stage without success. Well then was squeezed and abandoned. It then was reperforated (8200–05′), treated with 400 gal. of sand consolidation plastic in two stages and is producing 180 BPD, through an 8/64″ choke, with 0.1% water, sand-free.

Application techniques. Sand consolidation plastics have been employed successfully to shut off incompetent formations producing from some offshore wells in the Gulf of Mexico. Due to the high cost of offshore operations, most locations employ directional drilling and multiple completions from a single platform. It is important that positive sand control measures be employed that will reduce periodic workovers to a minimum. Since conventional sand control methods are not applicable to multiple completions, sand consolidation plastics usually are employed. As a result, most multiple wells are given the sand consolidation treatment upon completion, before any appreciable quantities of sand have been produced.

A description of a recent sand consolidation plastic job on an offshore, multiple-completion oil well in the West Delta area will illustrate typical application procedures.

The hole was first loaded with weighted brine containing calcium chloride and sodium nitrate, weighing 12.5 pounds per gallon. Casing then was perforated with a tubing gun from 9,022 to 9,027 feet. A full bore squeeze tool equipped with two 32-foot joints of steel tail pipe was run. The tail pipe was adopted at 9,032 feet and 39 barrels of diesel oil was pumped into the tubing. This was the calculated amount required to circulate diesel oil up the annulus to the packer.

The packer then was set and diesel oil pumped down the tubing to break down the formation and establish an injection rate pressure. Two hundred gallons of sand consolidation plastic was injected down the tubing, followed by diesel oil, the oil already in the tubing being forced into the formation ahead of the plastic. The plastic was over-displaced into the formation by 1½ barrels diesel oil, after which the well was shut in for 30 minutes. Next, one barrel of diesel oil was displaced into the tubing, measuring from the time at which the formation was accepting fluid at a constant pressure. The well then was shut in for 30 minutes after which this procedure was repeated (pumping another barrel of diesel oil down the tubing). One hour later, an additional barrel of diesel oil was pumped down the tubing after which the well was shut in for six hours. An injection pressure test then was made to determine whether a second stage was required. Examination of the recording chart (indicating pressure vs. injection rate before and after the first stage) showed the degree of permeability left

TABLE 2—Gas wells also have proven receptive to the plastic consolidation treatment. Here are results of 19 jobs performed on gas wells in the Gulf Coast area.

Well	Producing Depth-Ft.	Feet of Perforations	Breakdown Pressure-psi	Initial Squeeze Pressure-psi	Final Squeeze Pressure-psi	TUBING FLOWING PRESSURE		WATER PROD. IN BPD			Life of Squeeze in months as of 8-58
						Before	After	Before	After	Present[5]	
1	11,516	8	1300	3300	3000	3900	3750	60	20	300	17
2	11,667	7	1700	1700	1700	3800	3500	60	120	1300	32
3[1]	11,672	10	3500	3500	3500	3800	3550	40	97	250	11
4	11,507	10	3500	3500	3500	3800	3650	61	10	400	8
5[2]	11,502	22	1100	1250	1250	3650	3575	67	17	200	12
6	11,516	8	800	800	1000	2500	None—Well failed to flow—Tbg. plugged—Worked over.				
7[3]	11,516	8	1900	1900	2000	2500	2500	110	33	Not successful	
8	11,516	8	700	600	700	2500	2500	110	110	1300	18
9	11,502	22	1100	1100	1250	3250	3000	200	228	380	9
10	11,665	15	1425	1425	1425	3800	3650	160	225	1160	32
11	11,179	28	1600	1600	2100	3800	3750	38	12	105	24
12	11,264	10	1400	1400	1550	3750	3750	19	4	2000	13
13[4]	11,508	45	500	200	0	2500	2025	420	350	420	3
14	10,315	7	1100	1000	1300	3500	3100	117	117	220	33
15	10,035	20	900	800	950	3600	3505	0	0	7	31
16	10,250	14	900	900	900	3050	3050	8	3	3	21
17	10,094	4	200	0	200	2500	2500	262	240	950	20
18	10,673	20	2100	3900	3900	3000	2900	22	27	400	25
19	8,628	10	1600	1600	900	2400	2400	648	245	1500	17

[1] Not successful.
[2] Sand production stopped for only 12 months at which time another 200 gal. stage successfully restrained sand production.
[3] Used only ½ batch (100 gal) which was not successful. Resqueezed with second ½ batch successfully.
[4] Used one and one half batches (300 gal.) because of large number of perforations open—job successful.
[5] Or prior to workover, for reasons other than sand production.

after the first stage and the desirability of an additional stage.

The second stage of 200 gallons of sand consolidation plastic was applied using the same application technique. Eight hours after the completion of this second stage, the diesel oil in the tubing was displaced into the formation with weighted brine, at an injection rate of no more than one barrel per minute. As soon as the well was dead, the packer was unseated and the tubing lowered to run the tubing gun and perforate from 9282 to 9287 feet. All steps described on the first zone then were repeated to consolidate the lower zone. Each additional zone to be produced was treated independently with sand consolidation plastic, using two stages of 200 gallons of plastic each. Following the final application, the well was shut in for 36 hours before placing it on production.

If the well is completely circulated, eight hours following completion of the final stage, it is possible to pull the squeeze tool from the hole and make the completion setting. The well should not be produced, however, until the plastic has had time to shrink and attain its final set.

The success of offshore sand consolidation jobs, using these application techniques, has been extremely gratifying. Table 1 shows the results obtained on a number of jobs in the West Delta area.

Most wells in this locality, producing from a depth of 7,500 feet or less, make sand on initial completion. Sand production becomes more severe as time goes on until the wells eventually sand up. Sand production from the deeper wells usually is less severe and does not become a serious problem until after water production begins. Results of the preventive use of sand consolidation plastic, in this respect, cannot be fully evaluated until a greater number of these wells begin producing water. It will be noted from Table 1, however, that two of these wells are making considerable water, yet are producing sand-free.

Gas well application. The use of sand consodidation plastic also has proven advantageous in some Gulf Coast high-pressure gas wells.[8] A typical example can be cited in a well in the Tigre Lagoon field. This well, producing from the Miocene sand at a depth of 11,655 feet, was producing 100-150 mesh sand that had reduced high-pressure water-knockout of four to five months to less than dump valve trim life from an average one month. Sand production could be alleviated by reducing flow rate from the well; however, a more permanent solution to the problem was desired, and a sand consolidation squeeze job was performed using 200 gallons of plastic.

The formation was broken down with 200 gallons of lease distillate to establish a feeding rate, after which the plastic was pumped down the tubing, followed by additional lease distillate to displace it into the formation. A two-barrel overflush was employed to insure against leaving in the casing. The well then was shut in for 24 hours, after which it was returned to production without difficulty. Sand production was stopped and trim life on the high-pressure

About the Authors

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water-knockout was improved to over four months. Table 2 shows the results of this and other sand consolidation jobs in this same field. In all, a better than 85, percent success ratio has been maintained on these treatments.

Associated factors. Failures experienced in plastic sand consolidation work have been studied in order to determine their probable cause. One important influencing factor is believed to be that many of the wells previously had been perforated in mud. This has been thoroughly evaluated and results of additional research have shown that formation damage and plugging of perforations does occur when a well is perforated in mud. These plugged perforations will not accept sand consolidation plastic when it is displaced into the formation. As a result, this particular section is not consolidated, and when the well is returned to production, the mud block may break down, allowing sand to be produced through the previously plugged perforations.

This difficulty can be avoided by perforating in water or similar well workover fluids which will not plug newly-formed perforations. If all perforations are open, a more uniform distribution of plastic over the vertical extent of the pay can be obtained.

Another precaution that can assist in the control of sand is to limit the vertical extent of the perforated intervals. Prior to using sand consolidation plastic for completion, the customary procedure was to perforate the entire producing interval (10 to 18 feet). With present day sand consolidation techniques, completion procedures call for perforating only a 5-foot section in the best permeability of the pay farthest removed from the gas cap or the oil-water contact, as indicated by study of the micrologs. It is believed that adequate vertical permeability usually is present to assure drainage of such a section through the 5-foot perforated interval. This procedure also provides maximum protection between perforations and any shale breaks, unproductive zones, or water zones, above or below the producing interval. It assures proper placement of plastic and minimizes the possibility of the plastic channeling into unwanted sections.

Proper positioning of tail pipe also is believed to be an important factor in the success of a sand consolidation job. In most jobs, the packer is set so that the tail pipe will extend below the perforated interval. When the plastic is pumped down the tubing, it follows the oil out the end of the tail pipe, up over the perforations and into the formation. In this way, the plastic is kept uncontaminated. If the end of the tail pipe is above the perforations, there is the possibility that the plastic emerging from the end of the tubing may mix with the water or oil in the hole and thus, when it enters the formation, it may not be a completely homogeneous fluid.

It also has been found that residual formation permeability, following a plastic sand consolidation treatment, is improved by pumping oil slowly through the plastic before it has attained its consolidation set. By pumping diesel oil or distillate behind the plastic before it reaches its gel set, plastic in excess of that actually required to coat the sand grains is displaced farther back into the formation, extending the depth of penetration of the plastic and the areal extent of formation consolidation. Since the plastic is not oil-soluble, the overflush that is pumped through will not completely remove plastic from sand grains coated previously. Another advantage of this method is the assurance that a greater percentage of the void spaces resulting from the shrinkage of the sand consolidation plastics will be interconnected, resulting in improved permeability. The preferred pump rate maintained during this overflush operation is approximately 0.5 barrel per minute.

This article is based on a paper entitled *Recent Developments in the Application of Sand Consolidation Plastics* presented at the annual meeting of the Southern District, Division of Production, American Petroleum Institute, at New Orleans, March 25-27, 1959.

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New DST technique

Continued from Page 158

is inert, it has obvious advantages over other readily available gases for this purpose. Nitrogen also is being used to purge propane, butane and gas lines before repair. Purging refineries with nitrogen has, in some instances, actually cut down-time over 80 percent.

Testing surface equipment. Another recently developed use is the testing of surface equipment for high pressure leaks on drilling wells. Wells on which blow out equipment may be subjected to abnormal pressures are particularly vulnerable to catastrophe from leaks that develop in surface equipment when subjected to high pressure gas, but that hold pressure when tested with mud. To test surface equipment, a hookwall packer may be set in the casing below the surface to blank off the formation. The drilling fluid may be drained out of the flow lines and other surface equipment down to the casinghead valve. The blow out preventers then may be filled with water. A small amount of nitrogen turned in through the casinghead valve will agitate the water and wash out the connections. After draining the water, nitrogen pressure may be exerted against the rams and entire surface equipment to the desired test pressure. Essentially the same method may be used for testing air or gas drilling equipment. Leaks have been detected with a 2,000 psi nitrogen test that were not detected with 4,500 psi conventional mud pressure.

Nitrogen can be useful in many operations where an inert gas is desired. It is being considered as a tracer in water-flooding operations. It plays a part in a new process designed to shut off water in gas or air drilled wells. This process requires that diesel fuel be displaced across the water bearing formation to sweep water out of the well bore, after which silicon tetrafluoride gas is squeezed into the formation. When the silicon tetrafluoride gas contacts water, silicon dioxide is precipitated in the form of silical gel. This insoluble precipitate effectively blocks the permeability and shuts off the water flow. Nitrogen is used to displace the diesel fuel and silicon tetrafluoride gas in this operation.

—The End

New techniques are opening up new areas to air and gas drilling

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The greatest recent achievement in air and gas drilling is primarily in the use of chemicals to combat the influx of formation water.

Other advancements in air or gas drilling:

- **Development of an efficient water shut-off which has opened many new areas heretofore condemned for economical air and gas drilling**
- **Drill string assemblies**
- **Tool drilling, automatic surveys and continuous drill stem testing**
- **Air and gas drilling in cleaning out and stimulating old producing wells.**

During the past few years, the problem of experienced personnel is no longer evident to the industry. Contractors, operators and service companies have trained men and crews to efficiently use air and gas drilling techniques.

The success of air or gas drilling depends upon the proper interpretation of geological and drilling information available from nearby locations. Many problems can be eliminated or anticipated to determine the economical use of air or gas.

Water intrusion is presently the most glaring obstacle for air or gas operations. This water influx can be divided into three classifications:

1. Weeping zones—flowing less than 3 barrels of water per hour.
2. Intermediate flows—flowing 3 to 50 barrels of water per hour.
3. Heavy flows—flowing in excess of 50 barrels of water per hour.

Weeping zones. Weeping zones are determined by a decreasing volume of dust returns, slowly increasing air pressure, increase in cutting size, increasing rotating torque, and dragging of drill string on connections. As much as 100 feet of hole can be made before a weeping zone is noticed. Continued drilling may result in stuck drill pipe.

The use of dry chemical powder

Equipment Requirements for Air Drilling

	Surface Holes 12¼" to 22" Wet or Dry	Under Surface Pipe to 5000' (dry) 7⅞" to 9⅞" Hole	Under Surface Pipe to 5000' (wet) 7⅞" to 9" Hole Mist Drlg.	Under Intermediate Casing 2500' to 15,000' (dry) 7⅞" to 9⅞" Hole	Under Intermediate Casing 2500' to 12,000' (wet) 7⅞" to 9⅞" Hole Mist Drlg.	Coring In Soft Formation	Coring In Hard Formation	Aerated Mud Fast Penetration 6¾" to 9"	Aerated Mud Loss Circulation
Air Volume	2500 cfm to 4000 cfm	1500 cfm to 2000 cfm	2500 cfm	1500 cfm to 3000 cfm	2500 cfm to 4000 cfm	1000 cfm to 2000 cfm	1000 cfm to 2000 cfm	1500 cfm to 2000 cfm	50 to 150 cfm per bbl. of fluid circulated
Air Pressure	60—350 psi	60—250 psi	200—350 psi	100—300 psi	300—1500 psi	250—500 psi	250—500 psi	500—1250 psi	500—1000 psi
Drill String & Well Head Equipment	Cutting Deflector Float valve Bleed line	Double BOP Rotating head Float valve Bleed line	Double BOP Rotating head Float valve Bleed line	Double BOP Rotating head Float valve Bleed line	Double BOP Rotating head Float valve Bleed line	Double BOP Rotating head Bleed line	Double BOP Rotating head Bleed line	Double BOP Rotating head Float valve Bleed line	Double BOP Rotating head Float valve Bleed line
Flow Line	9⅝" Flow line	100' to 300' 7" or 8⅝" Flow line Sample Catcher	100' to 300' 7" Flow line Sample Catcher	200' to 300' 7" Flow line Sample Catcher	200' to 300' 7" Flow line Sample Catcher	200' to 300' 7" Flow line	200' to 300' 7" Flow line	7" Flow line Mud-Air separator	7" Flow line Mud-Air separator

has been successful in overcoming this problem. These powders are added to the air stream with a solids pump at a recommended injection rate of 1 to 4 percent of cuttings weight.

Calcium stearate or silica gel are the most commonly used dry chemicals. This finely ground powder coats the cuttings and effectively repels any water. Through this action the cuttings do not ball or plaster and the removal of previously formed mud rings is initiated.

Both calcium stearate and silica gel will reduce the torque. This action is particularly useful in holes where deviation has increased rotation force.

Intermediate flows. The most significant advancement in air and gas drilling used to overcome this problem.

Surface indications again determine when mist drilling should be utilized. These are sudden and complete cessation of dust returns, increasing air pressure, bit balling, and a change in penetration rate. Continued blowing should produce fluid at the flow line.

The volume of water production, measured at the flow line and the hole depth, determines the economic limit of mist drilling. Maximum penetration rate and bit life can be maintained with the following water volumes:

Barrels of Water Per Hour	Depth in Feet
50	2,500
40	3,000
35	4,000
30	5,000
25	7,500
20	9,500

In drilling large-diameter surface holes to 1,500 feet, no chemicals are required. However, a continuous injection of 5 to 10 gallons per minute of water is necessary. Water volumes in excess of 100 barrels of water per hour have been handled in this manner.

Foaming agents are the determining factor in successful mist drilling. They should be capable of foaming fresh, salt and sulfur water. An action to prevent wetting of shales is also desirable. Additionally, they should prevent corrosion of drill pipe and casing and furnish lubrication for bit bearing.

Of the many commercial foaming agents on the market today, none satisfy all these conditions. At best, it requires the selection of different foamers for different water conditions and the addition of separate chemicals for corrosion inhibitors and lubricity qualities. A foamer to be used when oil is encountered is also needed.

The saline content, oil-and-water-influx volume, penetration rate and compressor horsepower determine the variations of concentrations of foaming agents.

In most cases a mixture of 1 gallon of foamer to 10 barrels of water, with a corrosion inhibitor and lubricity additive injected over a one-hour period, will control most conditions.

Air pressures are generally 100 psi higher than when dry drilling, thus raising the horsepower requirements 10 to 20 percent to maintain a clean hole. While drilling soft formations in mist drilling severe hole enlargements result.

In spite of these problems, field results indicate that mist drilling is approximately 80 percent as effective as dry-air drilling.

Heavy flows. In almost all cases other than at shallow depths, a 50 barrel of water per hour flow marks the end of economical use of air or gas, unless an areated fluid could be beneficial.

To combat heavy flows, it is necessary to completely or partially shut-off the water.

Cement has been used for partial shut-off with some success. However, the time, cost and percentage of success leave much to be desired. A polymeric water gel has been used successfully, although it has some unwanted features. A plastic has been used, but it has a prohibitive cost unless a good saving is to be anticipated through its use.

A new development is the use of silicon tetrafloride gas. This gas appears to be simple to use and it is economical, both in cost and time. It involves nominal rig time in isolating the water zone with packers and squeezing the gas into the formation where an insoluble precipitate is formed upon contact with water. This precipitate effectively blocks the permeability.

A new-type inflatable packer that can be run in the drill string and set after penetrating a water zone has been developed. With this drill-collar packer, two trips are saved and the squeezing cost is further reduced.

Crooked hole. In regard to crooked hole, two or more large drill collars are usually run just above the bit. If the possibility of drilling through crooked zones exist, then most operators start taking preventative measures in "packing the hole" while it is still straight. This technique of packing the hole holds drift to a minimum out to 2 or 3 degrees. Packing is normally done by running a 3 or 6-point reamer above the bit and a stabilizer at 30 feet above the bit. A second stabilizer at 60 feet will increase rigidity of the lower drill collars even more.

Several wells were drilled in the Juno area, Terrell County, Texas, using a 10-foot fluted drill collar. The flutes were only ⅛ inch less than the gage of the hole. The drill collar flutes will wear rapidly; however, rapid drift in the vertical hole is prevented.

Several experimental types of reamers are now being tried. The principal problem on standard-pin and roller-type reamers is drastic wear on the pin. To clean the bearing between pin and cutter, air-vent holes allowing air to pass from the bore of the drill string out through the cutter pin to blow the cuttings out of the pin and cutter bearing are now being tried. A number of new wear resistant materials are being tried on the pins.

Both pin- and roller-type reamers and rubber-sleeve stabilizers have been used extensively. The long contact area on the sleeve-type stabilizer will provide more centering effect and less underreaming of the hole. The rubber also acts to cushion the drill collars against the wall of the hole. Usually hole temperatures in excess of 250° F. will loosen the rubber bond, thus limiting the use of these tools in high temperature wells.

In deviated holes of 2 to 3 degrees or more, the pendulum effect is generally utilized. This means the hole-packing reamers just above the bit are dropped out and a stabilizer is usually run at 60 feet along with two large collars on bottom. This increases the free length of drill collar above the bit, thus providing a longer, heavier pendulum. This pendulum creates a continual straightening of force while drilling. Continued heavy weights will cause the hole to continue to build angle, but when contractual limits are reached, more weight can be run with

a longer pendulum on bottom than with drill collars alone on a "packed" bottom-hole assembly and still maintain the same angle.

Undergage hole becomes a severe problem in an air or gas drilled hole because of the long runs made by the bits and inability of the driller to know when a bit is undergage. Increase in torque in a mud hole many times indicates when to pull a bit, but this increase in torque in an air hole is not really so evident. To provide additional gage-cutting assistance to the bit, conventional reamers are generally run. To date the regular wide-tooth chert cutter has been used but experimental runs are now being made with reamer cutters having tungsten-carbide inserts. The amazing success of the use of rock bits with tungsten-carbide inserts for teeth has pointed to the use of this type of cutter in the reamer also.

On several holes a diamond reamer has been run. The high initial cost of this tool makes evaluation of the results most important in judging its economic value. The diamonds are excellent to resist the abrasive wear, but losses of the diamonds in the hole caused by the matrix wearing away will ultimately determine the success of the tool.

Sloughing hole. At the present time there has been no satisfactory method developed for controlling a sloughing hole. Many holes have had to be mudded up because of formation sloughing. In shallow wells or wells in which a casing point can be reached in two or three days of drilling, the mist-drilling technique sometimes helps plaster the wall to the point where it will stand up. It is not recommended that this method be used if considerable hole is to be made.

New tools. Air compressor design did not change appreciably during 1958. A trend toward higher-pressure equipment being about the only factor.

The development of an automatic gas detector will be very helpful. In using air or gas for the drilling medium it is often difficult, if not impossible, to detect small oil and gas shows until circulation is stopped for connection. This leaves the operator in the position of not knowing within a minimum of a 30-foot interval where the top of such shows occurred. Also when multiple shows are encountered over a short distance of hole penetrated, it is quite difficult by flame observation alone to note new gas or oil pays in their proper chronological order. A method has been worked out by hydrocarbon logging companies with the use of automatic gas-detecting devices which will solve these problems quite economically. This device can be rigged to ring a bell or flash a light when hydrocarbons are encountered. Also, a chart will record the volumes of gas the well is making, thus giving the operator an inexpensive drill-stem test.

The percussion drill was initially tested in 1958 and should be available soon. This tool offers up to 6 times conventional penetration rates. It also may prove to be an answer to crooked-hole problems as tests indicate it to drill more vertical.

The percussion tool drawback at the present time is bits. The star-type bit loses gage rapidly and the conventional bit has its bearings beaten out or a cone knocked off. A new-type bit or a tool capable of working with present-type bits should be on the market soon.

A bottom-hole float that indicates excessive deviation is now available. This tool can save much costly rig time where slope test must be run every few feet.

Air cleanout. A direct descendent of air and mist drilling is air cleanout. This unique method is rapidly being accepted by the industry as an effective remedial procedure. Primarily used in old short holes with low bottom hole pressures, the cleanout removes any material in the hole and leaves the formation free of any sludge, salts, or other deposits. Wells with as much as 200 feet of open hole have been cleaned in less than 24 hours. Speed and the most effective cleanout possible combine to make air cleanout an additional economical tool for production.

This article was condensed from a paper "Advancements in Air Drilling During 1958" presented before the spring meeting of the Southwestern District Division of Production, API, Midland, March, 1959. The author acknowledges the assistance of Drilco Oil Tools, Rotary Engineers, Gulf Research, Halliburton Oil Well Cementing Co., and Sperry-Sun, in the preparation of this paper. —**The End**

Gilsonite in Cementing

Continued from Page 170

doned because of the severe lost circulation formations encountered.

Nine wells have been completed in another field using a pozzolan cement mixture containing gilsonite in concentrations of from 25 to 30 pounds per sack of the pozzolan cement blend. Nearly every well in this field will be completed in two producing zones, which are either broken or fractured limestone embedded in fairly thick, rotten-shale sections. Lost returns have not been as great a problem in setting of the production string as has been communication between zones caused by the channeling of the cement slurry during cementing. Consequently, every well had to be block squeezed to isolate the pay zones for fracturing and acidizing. Because of the scouring action of the gilsonite in the cement slurry, it appears to be helping remove the filter cake in the annulus during cementing. Nine wells have been completed in this field using gilsonite cement and each has been successful in that no block squeezing was required either before or after fracturing and acidizing.

Fifteen unsuccessful squeeze jobs were performed on another well using many types of cementing slurries in an attempt to seal off the perforations. When the well was squeezed using a gilsonite slurry, the perforations held a standing pressure of 2,500 psi after drilling out; however, they failed to hold a pressure of 3,000 psi as desired. Another squeeze job and a standing pressure of 3,000 psi was attained. Although this gilsonite cement squeeze job itself did not hold the desired pressure in this particular well, it did provide sufficient strength and bridging action for a second queeze job to be successful where 15 previous squeezes were of no benefit.

This article was condensed from the paper "Gilsonite—A Unique Additive for Oil Well Cements", presented at the Spring Meeting of the Pacific Coast District Division of Production in Los Angeles, April 30-May 1, 1959.

The authors wish to express their appreciation to the management of the Halliburton Oil Well Cementing Company for permission to prepare and publish this paper. —**The End**

Sun Oil Company's . . .

Drill stem logging tool is successful

Reduced costs, improved formation data are chief features of this new electric logging method. Surveys are obtained without removing pipe from the hole

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SUN OIL COMPANY has developed a new down-hole logging tool which permits electric logging of freshly drilled formations by pumping a self-contained recording mechanism down the drill pipe until an electrode assembly projects out through one of the mud passages in a jet bit into open hole. Logs are recorded during the normal process of coming out of the hole or the tool may be recovered by wire line. Three chief advantages of the new method are:

- Logging costs are reduced. Much less rig time is required to log a formation.
- Improved formation evaluation. Freshly drilled formations can be logged before drilling fluid invasion is excessive.
- Hazard of losing the hole while logging is reduced. Logging is achieved without removing the drill stem from the hole.

The device consists of a measuring and recording instrument body with a long, flexible electrode assembly at its lower end (Figure 1.) Whenever a log is desired, the tool is pumped down through the drill string with the instrument case coming to rest inside the drill collar. The electrode assem-

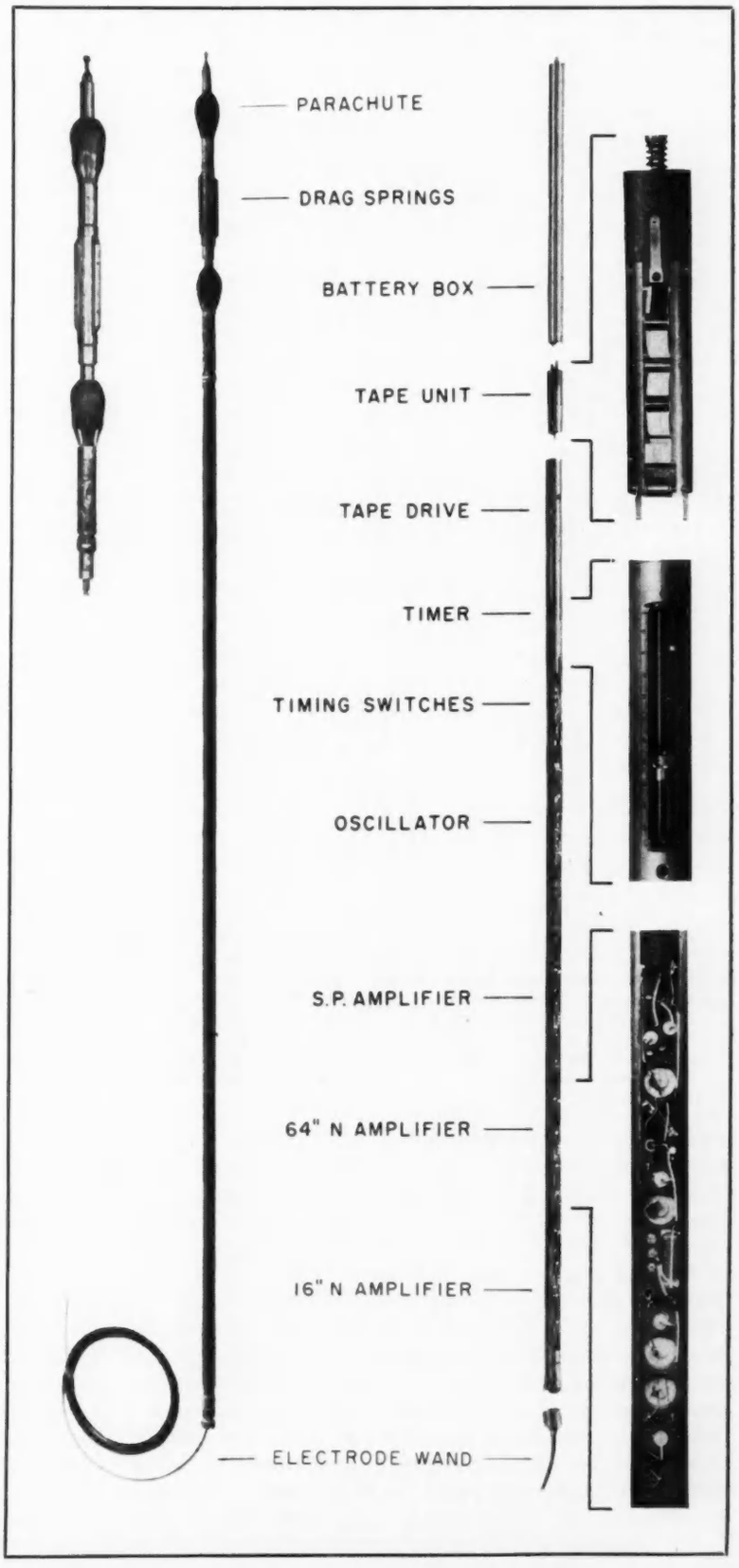

FIGURE 1—The body of the Sun logging instrument consists of a 2-inch OD case approximately 10 feet long which houses the measuring and recording equipment and the battery power supply. The electrode assembly or wand is attached to the lower end of the tube and is designed to pass through the water course of a jet bit. The parachutes and drag assembly used to control the pump-down rate are located near the top of the instrument. A standard core-barrel fishing head is provided at the top of the tool to facilitate handling on the rig floor and to permit recovery of the instrument by wire line coring equipment.

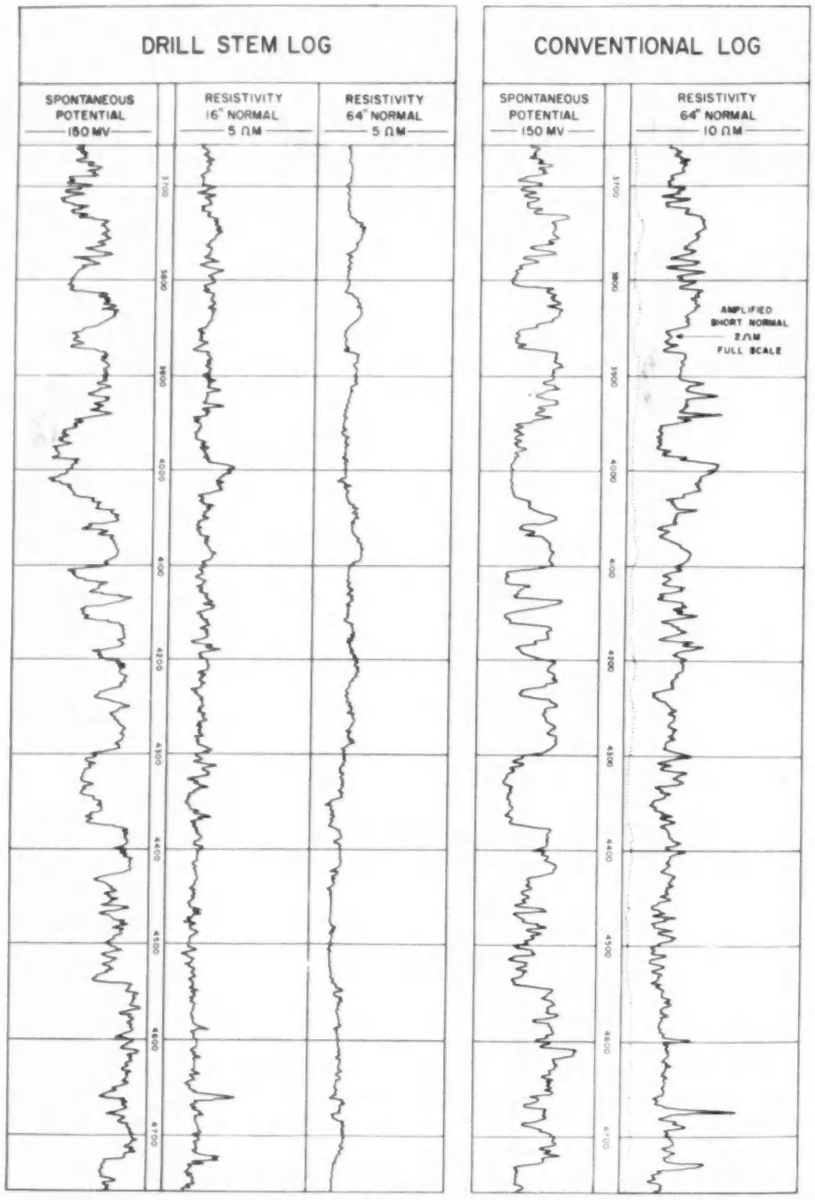

FIGURE 2—Here is a sample log recorded with the Sundrill-stem logging tool. The curves shown on this log are the 16-inch normal and the 64-inch normal, both recorded down hole at a full-scale sensitivity of 10 ohm meters and played back at a full-scale sensitivity of 5 ohm meters, and the spontaneous-potential curve which was recorded at a full-scale sensitivity of 400 millivolts and played back at 200 millivolts full scale. Also presented for comparison is a log of the same hole which was run by conventional methods approximately one day later. Both logs have been traced to present comparable curves of the two logs in one figure.

bly is washed out through one of the mud passages in a jet bit into the open hole below. Logs are recorded during the normal process of coming out of the hole. If this is done prior to a round trip, the tool is removed from the drill collar at the surface. Optionally, the drill string can be raised only through the logging interval and the tool recovered on a wire line. Conventional logging curves are recorded down hole on magnetic tape, which may be played back at the surface to produce a paper or film record.

The function of the various external parts of the tool can be understood more clearly from a description of pump-down and logging procedure.

A survey ordinarily is conducted during the process of pulling out of the hole to change bits. The instrument is loaded in the drill pipe with the electrode assembly uncoiled to its full length. The electrode wand remains uncoiled throughout the trip down the drill pipe. The instrument velocity during pump down is controlled by the action of the parachutes and by the mud-circulation rate. The parachute is a rubber element similar in shape to its namesake. The pressure drop produced by the weight of the instrument holds the rubber element in contact with the walls of the drill pipe and limits the velocity of the instrument to approximately mud velocity. This is desirable in order to prevent collapse of the electrode assembly which could result if the instrument case were allowed to fall freely through the mud column. The drag assembly, which is designed to control movement of the instrument through the drill collar, is limited to a maximum diameter slightly less than the inside diameter of the tool joints but greater than the bore of the drill collars. Hence this element performs no function during the trip down the drill pipe.

The instrument can be pumped down at any reasonable rate, but the circulating rate is adjusted before the instrument enters the drill collar to a predetermined rate established by the bore of the drill collar, size of the gage ring and the loading of the drag springs. In tests conducted so far, this circulating rate is approximately 250 gpm.

As the instrument enters the drill collar, the spring-loaded drags engage the reduced bore with sufficient force to more than support the weight of the instrument. The instrument continues its downward travel through the drill collar only if the circulating pressure drop across the instrument plus its weight is sufficient to overcome the friction of the drags. In present designs, the gage ring and drag springs are selected so as to require a minimum circulation rate of about 150 gpm to start motion of the instrument in the drill collar. The 250-gpm rate is chosen to safely exceed this minimum without causing the instrument to strike bottom with damaging velocity.

During the traverse of the drill collar, it is apparent from the preceding that the mud velocity is appreciably greater than the instrument velocity. As the mud stream flows out through the bit passages, the tip of the wand is guided to and through one of the openings and will extend below the bit when the travel of the instrument is halted by a stop inserted in the drilling string between the bit and drill collar.

The fact that the instrument is landed in logging position is indicated by an increase of about 200 psi in the circulation pressure. Mud passages

Continued on Page 202

For Your PRODUCTION File

PART 8

Evaluation of reservoir performance

New approach increases value of driving indexes by considering only produced reservoir oil

By Frank W. Cole
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PREVIOUSLY DEVELOPED indexes of drive have considered not only reservoir oil produced but also reservoir gas produced. Since the objective in most reservoir engineering studies is to *decrease* the amount of gas produced, these driving indexes have had limited application to actual reservoir engineering problems. The present development considers only the reservoir oil produced, and the utility of the driving indexes is increased considerably.

It's possible to evaluate the efficiency of operation of a reservoir by rearranging the material balance equation. The conventional material balance equation for a reservoir containing a gas cap and a water drive is:

$$N(u - u_o) + m\,N\,\beta_o\left(\frac{v}{v_o} - 1\right) = \Delta N\beta + \Delta N\,(R_c - r)\,v - (W - w) \qquad (1)$$

Where:
N = Original oil in place, stock tank barrels
ΔN = Cumulative oil produced, stock tank barrels
m = Ratio of original gas zone size to original oil zone size
W = Gross water encroachment, barrels
w = Water production, barrels
β = Oil formation volume factor
u = Two-phase formation volume factor
v = Gas conversion factor, barrels/scf
R_c = Cumulative produced gas-oil ratio, scf/stock tank barrel
r = Gas solubility, scf/stock tank barrel
f = Fraction of produced free gas coming from the gas cap
o = Subscript indicating conditions at original reservoir pressure

Before further utilizing Equation (1) it is necessary to understand the physical meaning of each of the terms.

$N\,(u - w_o)$ = The expansion of the original reservoir oil volume with all of its original dissolved gas. After reservoir pressure declines below the saturation pressure, some of the original dissolved gas will be evolved from solution and will occupy space as free gas in reservoir. Since, $u = (r_o - r)v + \beta$, this term can be expanded as follows: $N[\,(r_o - r)\,v + (\beta - \beta_o)\,]$.

Some of the free gas evolved from solution from the reservoir oil may be produced. To determine the *net* expansion of the original reservoir oil with all of its original dissolved gas, it is necessary to subtract from $N(u - u_o)$ that portion of the original dissolved gas which has been produced. This procedure will be discussed later in more detail.

$mN\beta_o\left(\frac{v}{v_o} - 1\right)$ = Expansion of the original free gas caps. Some of the gas cap gas may be produced, in which case, if the *net* gas cap expansion is desired, the gas cap gas production must be subtracted from the gas cap expansion. $W - w$ = Net water influx. $\Delta N\,(R_c - r)\,v$ = Free gas production may be comprised of both gas cap and free gas which was originally dissolved in solution in the oil.

Rearranging Equation (1) to solve for $\Delta N\beta$, the reservoir oil produced, yields:

$$\Delta N\beta = N\,(u - u_o) + mN\beta_o\left(\frac{v}{v_o} - 1\right) + (W - w) - \Delta N(R_c - r)v \qquad (2)$$

Examination of Equation (2) reveals that the reservoir oil produced, $\Delta N\beta$, is a result of (a) expansion of the original reservoir oil with its dissolved gas, plus (b) expansion of the original free gas cap, plus (c) the net encroachment of water into the oil zone, and minus (d) the free gas produced.

The utility of Equation (2) can be increased by separating the free gas production into its individual components: 1) gas cap gas production and, 2) free dissolved gas production. If *f* is defined as the fraction of produced free gas which comes from the gas cap, then the free gas production can be separated as follows:

$$\text{Gas Cap Gas Production} = f\,\Delta N\,(R_c - r)v$$

$$\text{Free dissolved Gas Production} = (1 - f)\,\Delta N\,(R_c - r)v$$

Rearranging Equation (2) as discussed previously yields:

$$\Delta N\beta = \left[N(u - u_o) - (1 - f)\,\Delta N\,(R_c - r)v\right] + \left[mN\beta_o\left(\frac{v}{v_o} - 1\right) - f\,\Delta N\,(R_c - r)v\right] + (W - w) \qquad (3)$$

The first bracketed term in Equation (3) is the *net* expansion of the reservoir oil with its dissolved gas and the second bracketed term is the *net* gas cap expansion. Equation (3) shows that the reservoir oil produced is a result of the combined effect of net expansion of the reservoir oil with its original dissolved gas, plus the net gas cap expansion plus net water encroachment. Dividing Equation (3) by $\Delta N\beta$:

$$1 = \underbrace{\frac{[N(u - u_o) - (1 - f)\,\Delta N\,(R_c - r)v]}{\Delta N\beta}}_{A} + \underbrace{\frac{mN\beta_o\left(\frac{v}{v_o} - 1\right) - f\,\Delta N\,(R_c - r)v}{\Delta N\beta}}_{B} + \underbrace{\frac{W - w}{\Delta N\beta}}_{C} \qquad (4)$$

Term A is the *Depletion Drive Index,* term B is the *Gas Cap Drive Index,* and term C is the *Water Drive Index.*

Determining the fraction of the produced gas which comes from the gas cap may be difficult at times, although usually enough production and reservoir engineering data will be available to satisfactorily determine this number. The usual method of determining f, is to determine the change in gas-oil contact from producing wells, after which, with a knowledge of the reservoir size, the amount of gas cap gas production can be calculated.

How to mechanize engineering and production records

Mechanical systems can result in substantial savings where there is sufficient concentration of data to justify their use

By R. K. Guthrie
Data Processing Center, San Antonio, Texas

THE APPLICATION of punched card and/or electronic computing machines to the mechanization of engineering and production records is a step toward fuller utilization of the vast accumulation of technical knowledge regarding oil and gas production.

Before any mechanization program is undertaken, it first should be determined how record keeping and data handling fit into the over-all organization of the production department and how the latter is linked with other company departments. Many requirements for production and engineering information from various departments within a company are similar enough that a mechanized system can be designed which will serve them all. Inasmuch as mechanization and the planning for mechanization are expensive,

ACKNOWLEDGMENT

This article is based on a paper presented at the Petroleum Conference on Production and Reservoir Engineering, Mid-Continent Section, American Institute of Mining and Metallurgical Engineers, Tulsa, March 20-21, 1958.

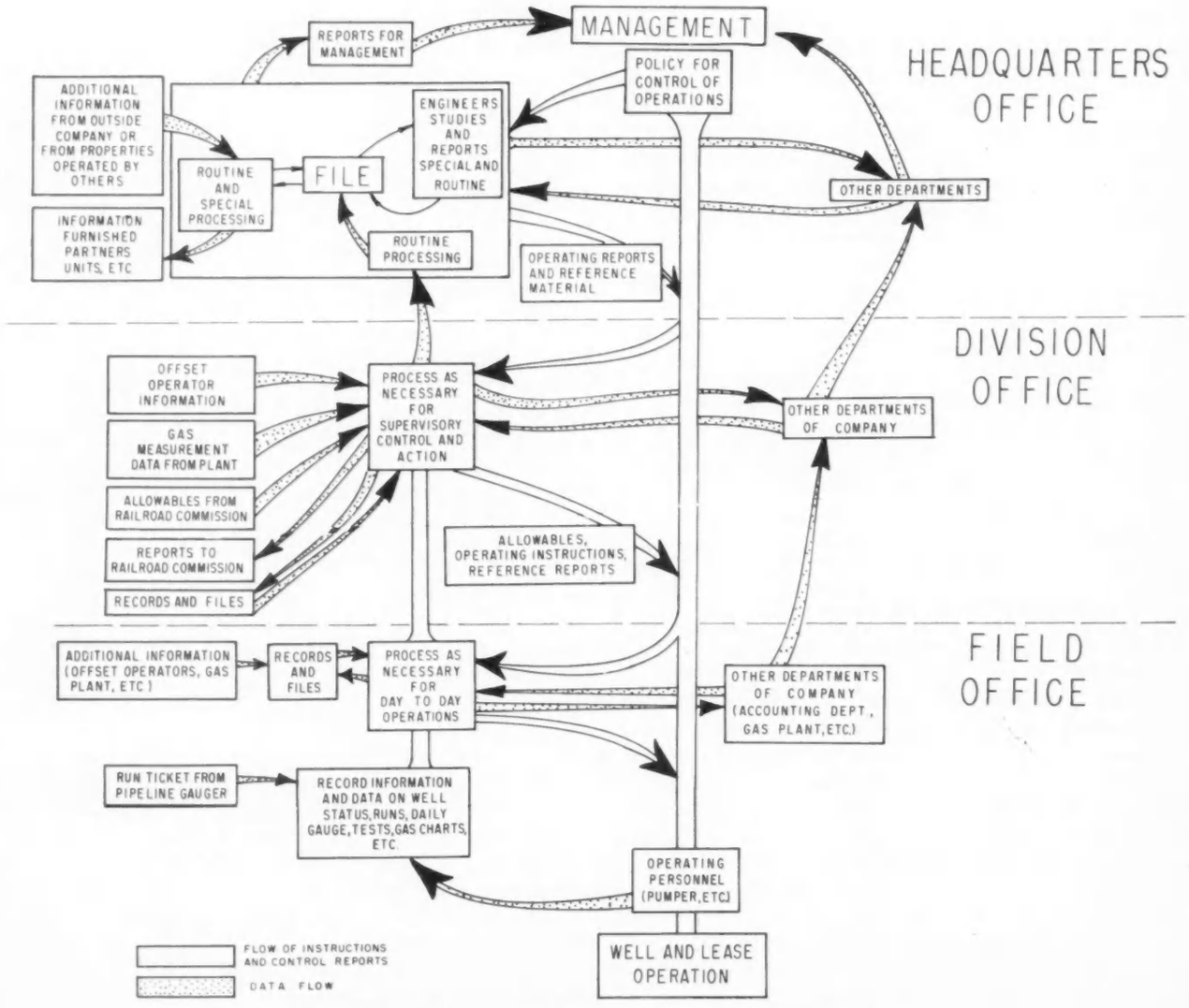
MANAGEMENT
REPORTS FOR MANAGEMENT
POLICY FOR CONTROL OF OPERATIONS
HEADQUARTERS OFFICE
ADDITIONAL INFORMATION FROM OUTSIDE COMPANY OR FROM PROPERTIES OPERATED BY OTHERS
ENGINEERS STUDIES AND REPORTS SPECIAL AND ROUTINE
ROUTINE AND SPECIAL PROCESSING
FILE
OTHER DEPARTMENTS
INFORMATION FURNISHED PARTNERS UNITS, ETC
ROUTINE PROCESSING
OPERATING REPORTS AND REFERENCE MATERIAL
DIVISION OFFICE
OFFSET OPERATOR INFORMATION
PROCESS AS NECESSARY FOR SUPERVISORY CONTROL AND ACTION
OTHER DEPARTMENTS OF COMPANY
GAS MEASUREMENT DATA FROM PLANT
ALLOWABLES FROM RAILROAD COMMISSION
ALLOWABLES, OPERATING INSTRUCTIONS, REFERENCE REPORTS
REPORTS TO RAILROAD COMMISSION
RECORDS AND FILES
FIELD OFFICE
ADDITIONAL INFORMATION (OFFSET OPERATORS, GAS PLANT, ETC.)
RECORDS AND FILES
PROCESS AS NECESSARY FOR DAY TO DAY OPERATIONS
OTHER DEPARTMENTS OF COMPANY (ACCOUNTING DEPT., GAS PLANT, ETC.)
RUN TICKET FROM PIPELINE GAUGER
RECORD INFORMATION AND DATA ON WELL STATUS, RUNS, DAILY GAUGE, TESTS, GAS CHARTS, ETC.
OPERATING PERSONNEL (PUMPER, ETC.)
WELL AND LEASE OPERATION
FLOW OF INSTRUCTIONS AND CONTROL REPORTS
DATA FLOW

FIGURE 1—Information flow and supervisory control diagram.

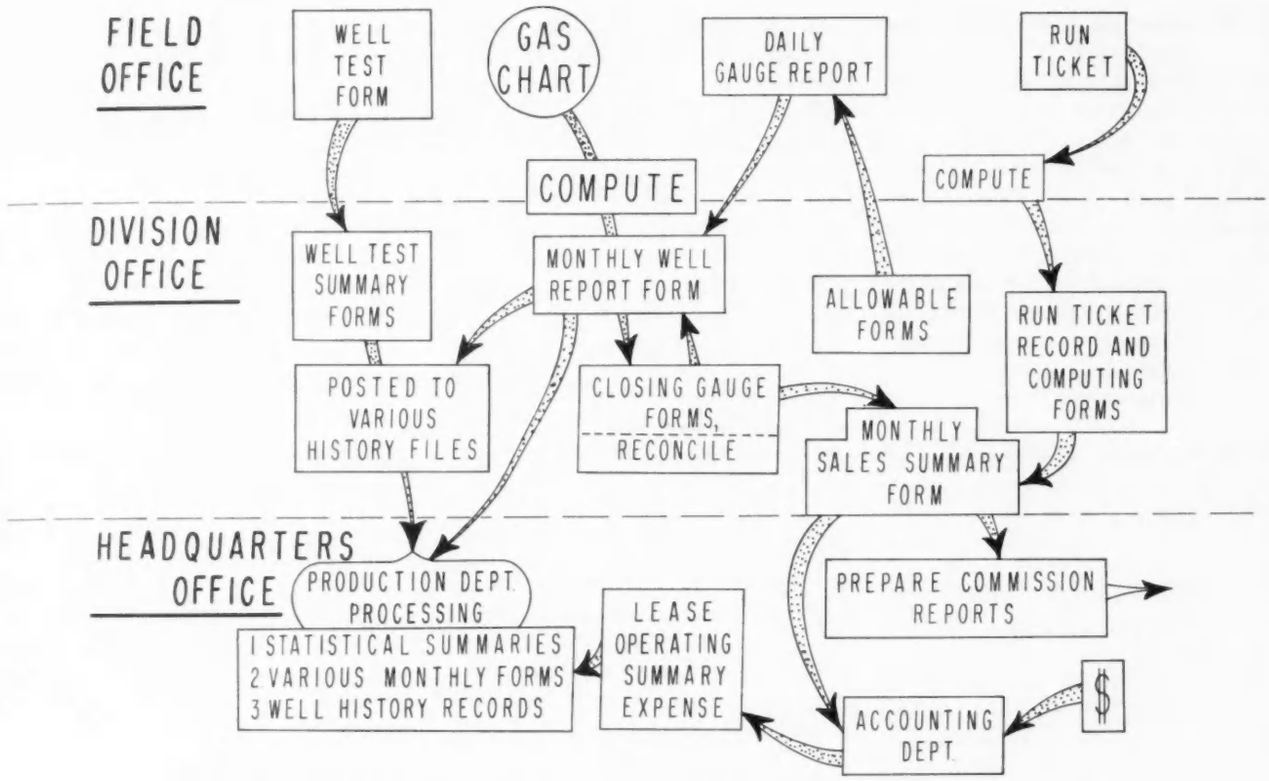

FIGURE 2—Abbreviated flow diagram of a manual system used for production record keeping.

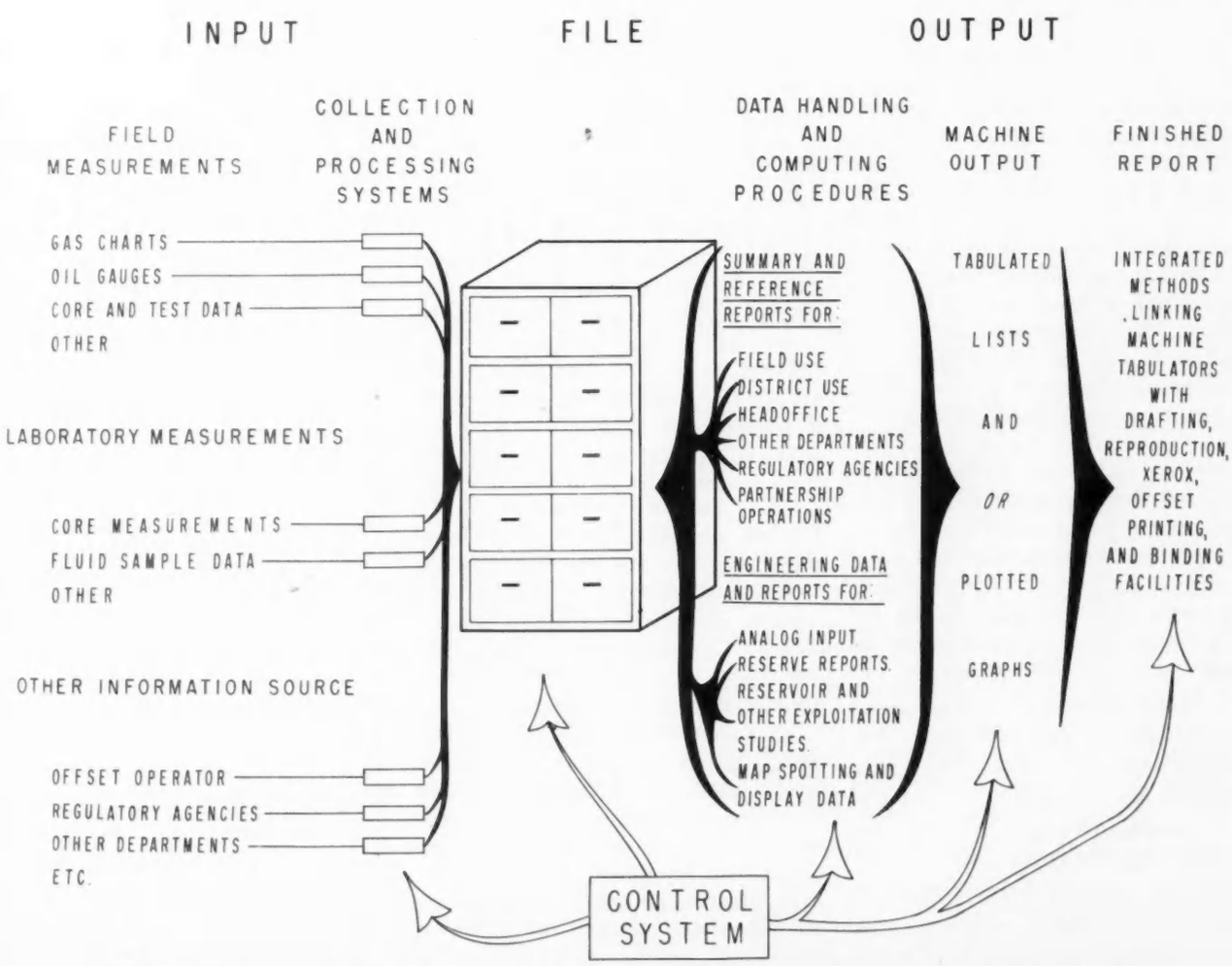

FIGURE 3—Functional diagram of a system for the maintenance of production and engineering records.

steps should be taken to prevent unnecessary duplication.

Figure 1 is a simplified diagram showing information flow and supervisory control channels in the producing department of a typical company organized with field, division and headquarters offices. The three items of data shown as being collected are those which contribute the bulk of the data processing problems in a company's producing department, namely, production (oil, gas, water), well test, and well status information.

Record-keeping processes. The next step is to survey the processing system currently used. How is the record-keeping ordinarily accomplished.

The flow diagram of Figure 2 is an abbreviated diagram of such a survey.

An important part of such a survey is the determining of the use of the various reports, why they are needed and how well needs are being fulfilled by present methods and schedules of preparation.

Designing a mechanization system. Figure 3 is a functional diagram of a system for the maintenance of production and engineering records. This diagram has been prepared without regard to whether the work is done manually, with punched cards or with a magnetic tape processing machine.

It will be found, in some instances, that systems already in use can be mechanized without major changes. Others, where procedures and forms differ from field to field, will require considerable change in system before an extensive mechanization program can be undertaken. In all cases, care should be taken not to impose any unnecessary changes, and current systems should be accepted as long as they perform economically and satisfactorily.

By referring to Figure 3, the six major features of the system can be noted:

1. Source of data.
2. Collection and processing systems for these data.
3. The file.
4. Data handling and computing systems for utilizing file data.
5. Preparation of finished reports.
6. A control system.

Once specifications have been set up for these features, the design of a punched card or computer program to mechanize the processing is not too complicated.

This problem is like many other computer problems in that defining the problem with detailed specifications is much more difficult than developing the actual computer program. It should be emphasized that production and engineering personnel must take an active part in developing these specifications.

Figure 3 illustrates that processing of various source data items can be separated completely. This permits the mechanization of run tickets, gas charts, daily gages etc. to be undertaken independently.

It should be noted that the output data handling and computing procedures are independent of each other. Here, again, the mechanization of monthly production summeries, EB reports, updating reserve reports and various engineering studies can be undertaken independently.

Features that link the work together are the design of the file itself and the system to maintain control of the file while processing to and from. Only these features will be discussed.

Design of file. Figure 4 illustrates the three main features of file design.

1. **Identification Codes,** which are used to identify data contained on a card and are also used as control for the most frequent data groupings, such as lease, well and reservoir.

2. **Data Cards.** The file is open-ended at this point, and a file which begins with only production can be extended to include well test, well status, core analyses, completion data, mechanical equipment etc.

3. **Master, or control cards.** have the identifying codes to link them with data cards and have expanded information regarding the identification codes. For instance, the lease master card could contain accounting codes, location codes, date of lease acquisition, company working interest fraction, other interest fraction, partnership codes etc.

The reservoir master card could contain a geologic formation code, type of producing rock code, crude oil character code etc.

This portion of the file also is open-ended and can be expanded to accommodate new and additional reports without a major redesign.

Control systems. Engineers and production personnel will do well to consult accounting methods for this function. Methods which accountants have developed for the control of information handling can be applied to good advantage by engineers whether or not they use machines.

A good control system is a must when handling data by machine, and it is a part of the work which engineers cannot leave to machine personnel. Rather, it is a part in which they must participate actively.

Controls should determine whether the information is accurate and meaningful before entering the file. Here the word "accurate" should be tempered with the quantity being measured.

A mechanized system is not the answer in every case, but such a system may be used to advantage where there is a sufficient concentration of such work. It is necessary in all cases if full advantage is to be taken of the advanced reservoir techniques which petroleum research personnel have developed as a result of their use of stored program computing machines.

—The End

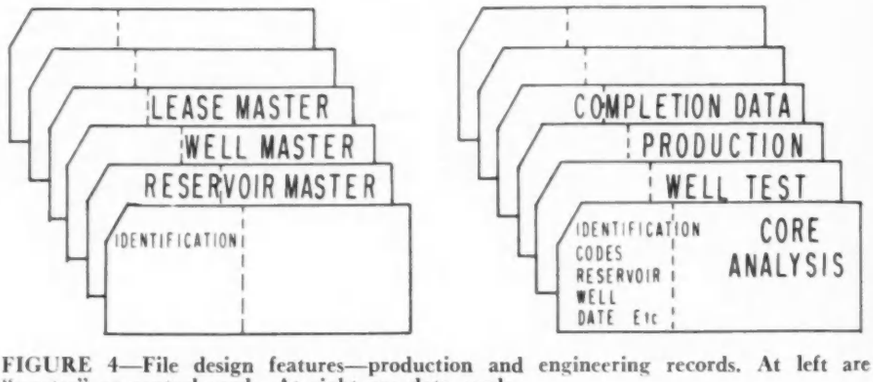

FIGURE 4—File design features—production and engineering records. At left are "master" or control cards. At right are data cards.

Smaller operators drill 77.5 percent of U. S. wells in 1958

By L. J. Logan
Associate Editor, WORLD OIL

INDEPENDENT OPERATORS and smaller companies, mostly producing less than 10,000 barrels of crude oil per day each, continue to drill over three out of every four wells completed in the United States.

In 1958 they accounted for about 37,456 wells, or 77.5 percent of the U.S. total of 48,331. This was a larger proportion than in 1957, when they drilled 76.4 percent of the total, or in 1956, when they drilled 76.7 percent.

The figures for 1958 are derived from the tabulation herewith. The table was compiled from recently issued annual reports of over 40 companies, including all the so-called major companies and several of the smaller integrated or producing companies.

The tabulation shows that 42 companies drilled approximately 10,875 net wells, or 22.5 percent of the U.S. total. That proportion was down from 23.6 percent in 1957 and 23.3 percent in 1956.

The 48,331 wells completed in the United States in 1958 represented a decrease of 5,452 wells or 10.1 percent from the 53,783 completed in 1957.

Gulf still first. As in 1956 and 1957, Gulf Oil Corporation again in 1958 drilled more U.S. wells than any other company. Its 1,511 net wells were less than the 1,754 drilled in 1957 but more than the 1,388 completed in 1956.

The Texas Company remained second in U.S. drilling in 1958, as in 1957 and 1956, after having been first in 1955. It completed 1,215 net wells in 1958.

Shell Oil Company again ranked third, having drilled 950 wells.

Standard Oil Company (New Jersey) rated fourth in U.S. drilling. Its affiliates, Humble and Carter, together drilled 726 wells (Humble 557 and Carter 169).

Standard (Indiana) drilled 620 U.S. wells, Standard of California 564, Socony Mobil 487, Continental 413, Skelly 403, Ohio Oil 392, Sun 310, Sinclair 305.

Amerada drilled 274, Phillips 271, Cities Service 266, Sunray Mid-Continent 261, Atlantic 211.

Number of Wells Completed in U.S. in 1958 by Larger Companies

Data from all available annual reports of U.S. companies with crude production and/or refinery runs above 10,000 barrels daily.

Company and Approximate Rank in Drilling	[1]Gross Wells	[2]Net Wells
Gulf Oil Corporation	....	1,511
The Texas Company	1,475	1,215
Shell Oil Company	....	950
Standard Oil Co. (N.J.) U.S. Affiliates (Humble & Carter)	....	726
Standard Oil Company (Ind.)	....	620
Standard Oil Company of Calif.	....	564
Humble Oil & Refining Company	....	557
Socony Mobil Oil Company	....	487
Continental Oil Company	575	413
Skelly Oil Company	....	403
Ohio Oil Company	577	392
Sun Oil Company	....	310
Sinclair Oil Corporation	....	305
Amerada Petroleum Corporation	324	274
Phillips Petroleum Company	454	271
Cities Service Company	425	266
Sunray Mid-Continent Oil Company	....	261
Atlantic Refining Company	....	211
Carter Oil Company	....	169
Tidewater Oil Company	....	168
Ashland Oil & Refining Company	....	165
Union Oil Company of California	190	142
British American Oil Producing Co.	217	131
Tennessee Gas Transmission Co. (Tenn. Gas & Oil Co. Divn.)	190	129
Pure Oil Company	....	122
South Penn Oil Company	....	122
Champlin Oil & Refining Company	136	81
Anderson-Prichard Oil Corp.	112	73
Honolulu Oil Corporation	84	69
Standard Oil Company (Ohio)	141	59
Richfield Oil Corporation	117	54
Signal Oil & Gas Company	....	54
Monsanto Chemical Co. (Lion Oil Company Division)	....	49
General Crude Oil Company	76	47
Texas Pacific Coal & Oil Company	64	40
United Gas Corporation	60	38
Argo Oil Corporation	62	33
Getty Oil Company	47	29
American Petrolfina, Inc.	51	27
Plymouth Oil Company	21	18
Texas Gulf Producing Company	39	17
Colorado Oil & Gas Corporation	27	15
Delhi-Taylor Oil Corporation	38	14
[3]Total above Companies	....	10,875
(Percent of U.S.)	....	22.5
Rest of Industry	....	37,456
(Percent of U.S.)	....	77.5
Total, United States	48,331	48,331

[1] All wells in which all or a part of the working interest was owned by the company. [2] That part of working interest applicable to the company, or the sum of all fractional interests. (In some cases, the figure given actually is explained as "the number of wells drilled by the Company." In such cases, the figure is believed by WORLD OIL to be approximately the same as "net wells," excluding some part interest wells drilled by others and including some wells in which part interest is owned by others. [3] Total excludes Standard (N.J.) as its affiliates, Humble and Carter, are included.

Surface evidence promises oil in western Switzerland

Oil, gas and asphalt have been found at surface in 39 areas in Molasse Basin and Jura Mountains

By Roland F. Schwab, Geologist
Buchaegerten, Roggwil, Be, Switzerland

WESTERN SWITZERLAND'S Molasse Basin and Jura Mountains may ultimately become "oil country." This is strongly indicated by an abundance of surface shows of gas, oil, and asphalt.

Up to now, no productive well or properly located oil or gas test well has been drilled in Switzerland. Wells that have been drilled have been mostly wildcats located at random.

But more and more attention is being paid now to oil possibilities in the country, especially the Swiss Molasse Basin, because of the abundance of surface shows.

This short report offers to geologists and managers of oil companies a resume of the oil, gas, and asphalt occurrences in the Molasse Basin and the Jura Mountains.

In an oil exploration program, surface shows of oil or gas are worthy of careful consideration.

In western Switzerland, 42 surface shows of oil, gas and/or asphalt have been reliably reported at 39 localities. Some of the occurrences are very small —tiny veinlets or small fissure fillings of black glassy asphalt in limestones of Cretaceous and Jurassic age.

The distribution of these 42 shows of oil, gas and/or asphalt in the complete stratigraphic sequence of western Switzerland is shown in Table 1.

The lithology of the above mentioned stratigraphic column is as follows:

Tertiary Molasse

Oligocene: 0—2,625 feet. Varicolored shale and marl with beds of fine- to medium-grain silty sandstone.

Cretaceous (lower)

Barrémien: 279 feet. White, cream colored or reddish fossiliferous limestone.

Hauterivien: 262 feet. Finely cristalline, oolitic or marly limestone.

Valanginien: 328 feet. Fine grained, platy, fossiliferous limestone.

Jurassic

Malm: 1,968 feet. Generally massive or thick bedded, hard, dense limestone, partly coralline or oolitic, alternating with laminae of grey marls.

Dogger: 525 feet. Oolitic limestone with some marly beds.

Lias: 148 feet. Dark black shales, marly limestones and coarse grained sandstones.

Triassic

TABLE 1

	Total of Shows	Gas	Oil	Asphalt
Tertiary Molasse				
Oligocene	21	1	20	0
Cretaceous (lower)				
Barremien	9	0	1	8
Hauterivien	2	0	2	0
Valanginien	0	0	0	0
Jurassic				
Malm	4	1	1	2
Dogger	3	0	1	2
Lias	1	0	0	1
Triassic				
Keuper	0	0	0	0
Muschelkalk	2	1	1	0
Buntsandstein	0	0	0	0
Cristalline soole				

Keuper: 492 feet. White sandstone alternating with dark grey shale, gypsum beds, salt beds and dolomite.

Muschelkalk: 623 feet. Porous dolomite, oolitic limestone, series of evaporites, bituminous shales.

Buntsandstein: 164 feet. Medium grained to coarse to conglomeratic sandstone.

The relationship between structure and occurrences of gas, oil and asphalt is as follows: 18 occurrences are situated on an anticline, 6 occurrences in a syncline, 5 occurrences along a fault- or dislocation-zone, 9 occurrences on a slightly faulted anticline, and 1—the most significant Val de Travers asphalt mine—on a slightly faulted syncline.

Four occurrences deserve special mention:

(1) NANT PUNAIS: about 7 miles due west of Geneva. Water with oil flows from a small spring. A pond at the source (about 5 feet in diameter) is covered with a thick scum of fluid oil, which can be skimmed from the surface of the water. Molasse Chattien rocks are at the surface. Less than one mile away Chattien rocks were mined. During World War I an attempt was made to extract oil from the saturated sandstones. Eight wells were drilled in the vicinity of the spring and mine. Although all had shows of staining or gummy oil, no fluid oil was recovered.

(2) Near EPOISATS (Canton of Vaud), an asphalt mine was operated in 1872. The host rock is Bathonien (Dogger, Middle Jurassic age), an oolitic limestone which has been finely brecciated adjacent to a large fault zone. The rock was reported to have yielded about 7.5% asphalt. Two or three hundred tons of rock were mined.

(3) Near the village of CUARNY (just south of Lake Neuchatel), there is a gas seep (89.2% methane; 10.2% nitrogen; 0.025% H_2S) which flows about 2,000 cubic feet of gas per day. Gas issues from Molasse Chattien rocks. The seep has been known since the year 1500 according to records made at that time. A well drilled about 500 feet west of the seepage found no gas and encountered faulted and steeply dipping beds. It was drilled to a depth of 7,310 feet, ending in Dogger limestones.

(4) The VAL DE TRAVERS asphalt mine (Canton of Neuchatel) started mining operations in 1837. It

is in active production today. 2,800,000 barrels of asphalt have been produced. Estimates (not company data) have been made that total ultimate production will range from 30 to 60 million barrels. The host rock is Lower Cretaceous Barrémien limestone. The structure is synclinal. The producing formation is overlain by Molasse sediments. They in turn have been overridded from the south-east by Jurassic beds during the great period of Jura Mountain folding, in late Miocene and Pliocene time.

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Wallace D. Wilson

John G. Staudt

Wilson and Staudt named to top offices in PESA

WALLACE D. WILSON, president of Wilson Supply Company, Houston, is the new president of the Petroleum Equipment Suppliers Association. John G. Staudt, executive vice president of Dowell Division of the Dow Chemical Company is vice president.

The two top officials of the association were elected for the 1959-60 term at the annual meeting of PESA held April 18-22 in Boca Raton, Florida.

Wilson, immediate past vice president of PESA, succeeds William T. Powell, executive vice president of manufacturing, Continental-Emsco Company, who served as president during 1958-59. Other new officers include:

Directors-at-Large. E. S. Dulin, Byron Jackson Tools, Inc.; Jack Crawford, Youngstown Steel Products of California; Frederick F. Murray, Oil Well Supply Division, U.S. Steel Corp.; A. W. McKinney, The National Supply Co.; Ted Sutter, Baker Oil Tools, Inc.; F. M. Mayer, Continental-Emsco; M. B. Jones, The S. M. Jones Co., Division of Buffalo-Eclipse Corp.; D. D. Bovaird, the Bovaird Supply Co.; M. E. Montrose, Hughes Tool Co.; Rainey Elliott, Jones and Laughlin Supply Division; Grover Kilgore, Halliburton Oil Well Cementing Co.; W. T. Powell, Continental-Emsco.

Directors—Eastern District. Karl Elliott, Acme Fishing Tool Co.; W. H. Greer, W. H. Greer Supply Co.; Lloyd Lanphere, Ajax Iron Works; Donald W. Mackie, Jr., Bradford Supply Co.; J. T. Murray, Midway Supply Co.; Bernard P. McDonough, Parkersburg Rig and Reel Co., Division Parkersburg Aetna Corp.; F. E. Rath, Spang and Co.; Paul Scherf, Alten Foundry and Machine Works, Inc.; John G. Seiler, Tube Turns, Division of Chemetron Corp.; H. Bernard Wehrle, McJunkin Corp.

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Directors—Pacific District. James Beré, Axelson Mfg. Co.; H. J. Hagn, Chiksan Co.; Harold Howard, Howard Supply Co.; Art Marshall, H. C. Smith Oil Tool Co.; I. J. McCullough, McCullough Tool Co.; H. H. Peters, Technical Oil Tool Corp.; John Pike, Republic Supply of Calif.; E. J. Weis, Pacific Pumps, Inc.; Elvin K. Wilson, Shaffer Tool Works; W. A. Wilson, Web Wilson Oil Tools, Inc.

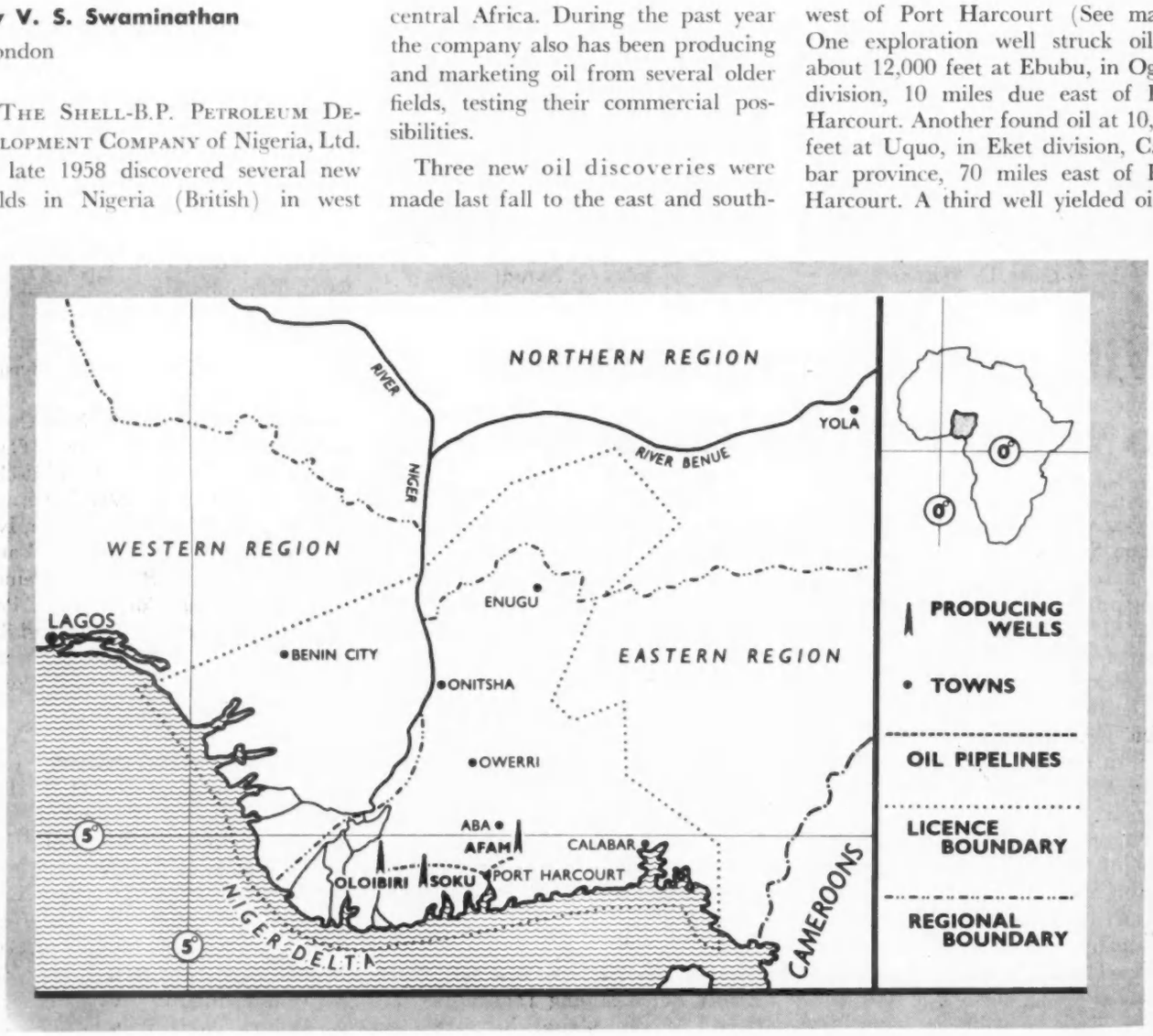
Production tests are being made to evaluate Nigerian fields

Crude oil from Oloibiri and Afam fields is being shipped to Europe. Newer Soku field will be tested later as it is in an early stage of development. Three additional oil fields were discovered last fall, but further tests will be required to determine their significance

By V. S. Swaminathan
London

THE SHELL-B.P. PETROLEUM DEVELOPMENT COMPANY of Nigeria, Ltd. in late 1958 discovered several new fields in Nigeria (British) in west central Africa. During the past year the company also has been producing and marketing oil from several older fields, testing their commercial possibilities.

Three new oil discoveries were made last fall to the east and southwest of Port Harcourt (See map). One exploration well struck oil at about 12,000 feet at Ebubu, in Ogoni division, 10 miles due east of Port Harcourt. Another found oil at 10,300 feet at Uquo, in Eket division, Calabar province, 70 miles east of Port Harcourt. A third well yielded oil at



Oil search in Nigeria. Sketch map showing activities of the Shell-B. P. Petroleum Development Company of Nigeria Limited.

(A Shell photograph)
Large pieces of mud fly above the mangrove during seismic work.

This drilling tender was brought to Nigeria for drilling in the tidal mangrove swamps.

12,000 feet at Krakrama, in Degema division, 15 miles southwest of Port Harcourt. The Krakrama well, in the heart of the Delta swamps, was the second to be drilled from the company's drilling barge.

Further tests will be required to determine the significance of these new discoveries.

The rig from Ebubu was moved to an exploration site at Miriegbe, 30 miles east of Port Harcourt. The drilling barge used on the Krakrama discovery well was moved to Ekulama, also in the Delta, 15 miles west of Krakrama.

Shell-B.P.'s deepest exploration well in Nigeria, at Ethiope in the Western Region, was abandoned last fall at 13,100 feet.

After 22 years of search, Nigeria is producing and exporting crude oil from two oil fields. A third field is in an early stage of development. The first cargo of Nigerian crude oil to be exported was shipped in February, 1958, from Port Harcourt to the Netherlands.

The oil was obtained from the Oloibiri and Afam fields.

The company has drilled over 20 exploration wells and found three oil bearing areas at Oloibiri, Afam, and Soku. The Soku field, in the swamps of the delta of the Niger River, in Rivers Province, 30 miles west of Port Harcourt, was discovered at the end of January, 1958.

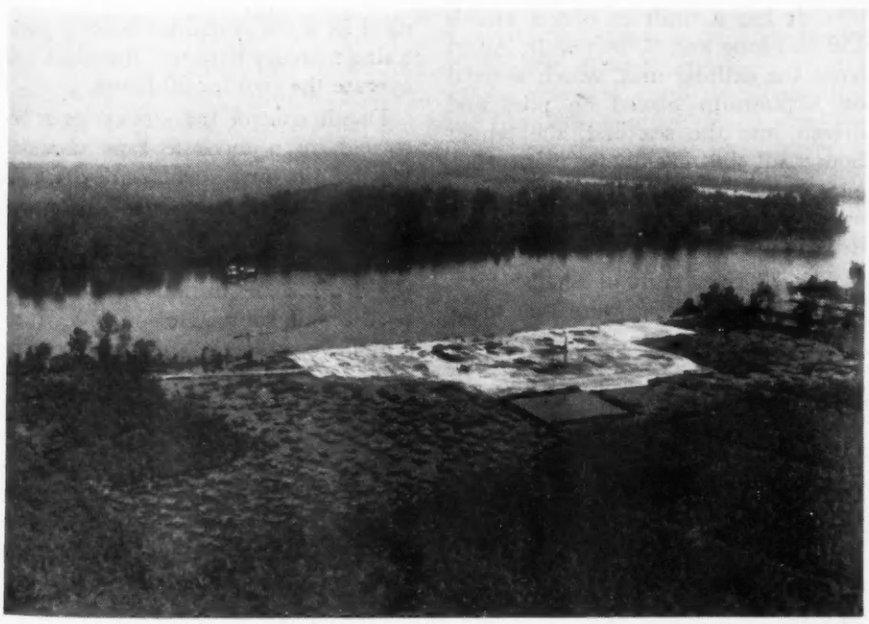
Another area yielded oil shows encouraging enough to warrant appraisal. It was at Akata, in Calabar Province, east of Port Harcourt. However appraisal drilling there showed little likelihood of oil in commercial quantities.

Appraisal of the Oloibiri and Afam structures was in progress during 1958, and oil from the testing of those wells was arriving in Port Harcourt by pipe line and by barge. This production test was being carried out to determine if Oloibiri and Afam could be developed commercially.

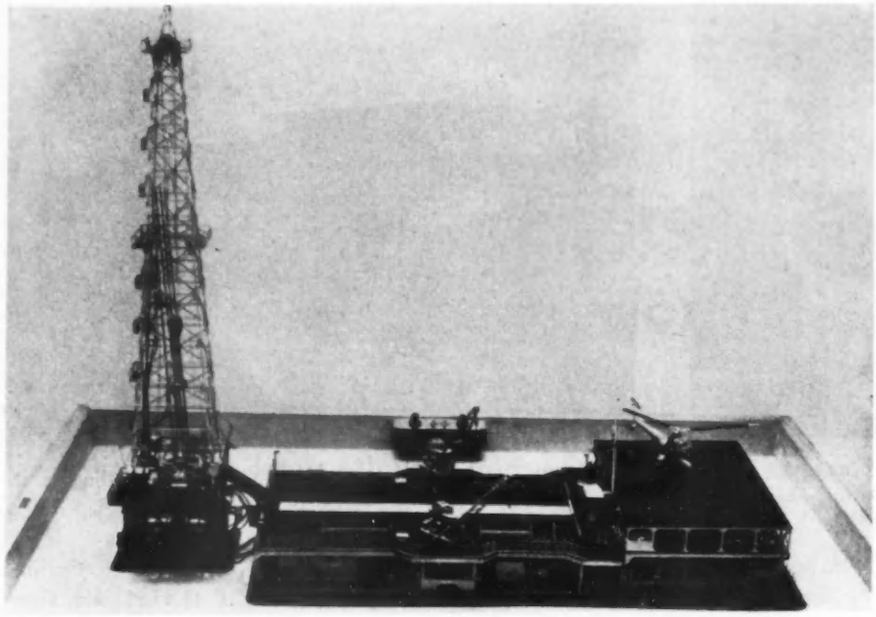
Oloibiri, discovered in January, 1956, was Nigeria's first oil field. Four productive wells and three dry holes had been drilled there by the spring of 1958. Following completion of a 10-inch pipe line, 65 miles long, from the field to Port Harcourt March 1958, its production was stepped up to 3,500 barrels daily. Oloibiri is in the heart of the sprawling mangrove swamps and humid Niger delta region.

The second potential field is at Afam, in Owerri Province, also in the eastern region of Nigeria. Three productive wells and two dry holes had been completed at Afam field by the middle of 1958. Oil from the field was being pumped 30 miles through a 6-inch pipe line to Port Harcourt at around 2,500 barrels a day.

Oloibiri and Afam together were producing about 6,000 barrels per day. Future output will depend on the decline rate of the existing wells and on the productive capacity of any further successful appraisal wells. The 1958 production tests and additional wells were needed to determine if enough oil can be recovered



(A Shell photograph)
An aerial view of the site of Shell-B.P.'s Soku 1, discovery well of the third oil field opened in Nigeria. The new producing area is situated between Port Harcourt and the Oloibiri field, Nigeria's first.



A model of the floating tender used by Shell-B.P. in Nigeria. Its drilling unit is fixed on a platform which is placed on piles and driven into the sea bed. Included also is a helicopter landing platform.

to justify the high costs of field development and the expensive tanker loading facilities required in absence of adequate deep water ports.

Cost factors include difficult climate and communications in terrain only four to five degrees north of the equator. Rainfall is incessant for over six months of each year and averages from 100 to 140 inches annually. Constant action is required to keep roads and bridges from being washed away. Temperatures and humidity range up to 100.

The terrain at Soku is particularly difficult. Immense quantities of sand had to be carried in to build up an artificial island for the first well. The most economical method of drilling further wells in the area was under study. It will be months before appraisal drilling can commence there.

Technical and administrative headquarters of the Shell-B.P. company are at Owerri, 69 miles north of Port Harcourt. Shell-D'Arcy geologists began the search for oil in Nigeria in February, 1937. Exploration subsequently has ranged far and wide over the 38,617 square miles that make up the Shell-B.P. prospecting licenses. But the most promising shows of oil have been found in eastern Nigeria.

In the future a continuation of the energetic exploration program is planned. There have been seven self-contained seismic parties operating in Nigeria. The company at mid-1958 had five dailling strings and one testing rig in operation. It was expected by the end of 1958 to be operating with a total of eight, or possibly nine, outfits.

For operation in the swamps a specially designed marine drilling tender was brought in to Port Harcourt late in 1957. It had been towed for over 4,000 miles by sea in six weeks from The Netherlands, where it was built. The tender, with its ancillary equipment, including a helicopter landing platform, cost $3,640,000. It has a draft of 8 feet and is 158 feet long and 80 feet wide. Apart from the drilling unit, which is fixed on a platform placed on piles and driven into the sea bed, the tender houses all the machinery, plant, fuel, and stores necessary for this type of operation. It can support non-stop drilling up to 30 days.

The 70 river craft of Shell-B.P. in Nigeria at mid-1958 were due to be increased by 70 more that were being built in British and other yards. The road fleet of 260 cars, trucks, and pick-ups must be kept on the move. Overhead, the four helicopters on contract must be serviced. At headquarters in Owerri, technical and administrative teams use a high powered radio day and night to keep in touch with men in the "bush." At Port Harcourt some 120 ships per year dock with cargoes earmarked for the company. —**The End**

Drill stem logging tool

Continued from Page 192

around the body of the instrument are provided so that circulation can be maintained with the instrument in logging position if this is necessary. Except for the landing stop, no modification of the drill string is necessary.

Conventional resistivity and self potential measurements are recorded down hole on ½-inch magnetic tape. The instrument case contains a logging-current generator and separate signal amplifiers for each of the curves to be recorded. An adjustable timing mechanism is set to delay the start of actual recording by as much as 45 minutes after the instrument is inserted in the drill pipe at the surface. This allows for the time required to pump the tool down into logging position. At the expiration of this delay period, the self-potential response is automatically adjusted to center scale and the tape drive is started. Sufficient recording tape for 80 minutes of operation is provided. At normal hoisting rates this allows logging of as much as 3,000 feet of hole with one pass of the instrument.

The expected accuracy of the various resistivity and self-potential curves is approximately 1 percent of the full-scale value selected. Logging circuits are designed to maintain this accuracy at temperatures up to 300° F. The instrument case will withstand bottom hole pressures of 15,000 psi.

Electrical power for the tool is supplied by a self-contained battery pack. Using mercury batteries, one pack will operate the tool for 30 hours.

Depth control information is recorded on a separate tape channel. During the first surface playback of the tape the depth scale is checked against the driller's depth at each stand. Any necessary corrections to the depth scale are made at this time so that all subsequent reproductions will have a depth scale corrected to driller's depth.

During playback to a paper record, the operator can choose any desired depth scale and has considerable freedom in the choice of full-scale sensitivity of the logging curves. The playback apparatus uses tape speeds approximately 10 times the down-hole recording speed, so that a paper record is available in less than 10 minutes after the tape is removed from the instrument. —**The End**

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Those of you attending the exposition may wish to do this even though you plan to inspect the equipment at the exposition. In this way you can have material which will refresh your memory later and make it unnecessary to collect and carry home a large package of literature from the exposition.

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AS A SPECIAL SERVICE for those attending the exposition, WORLD OIL has compiled and published a special classified directory of equipment on exhibit at the exposition.

This booklet is similar to the classified section of a telephone book. Companies and their exhibit locations are listed under different types of equipment. For example, all companies exhibiting drawworks will be listed under that heading, etc.

Copies of this directory, which includes a foldout map showing the locations of booths and exhibits, may be obtained by writing WORLD OIL now to get an advanced copy, or by visiting WORLD OIL's exhibit in Booths 149, 150, 181, 182 in the Oklahoma Building.

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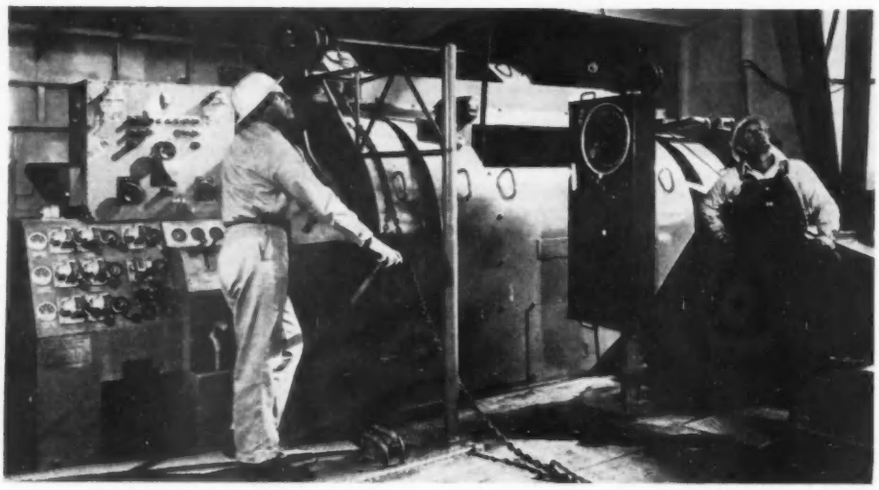
Equipment Exhibits

The National Supply Co.

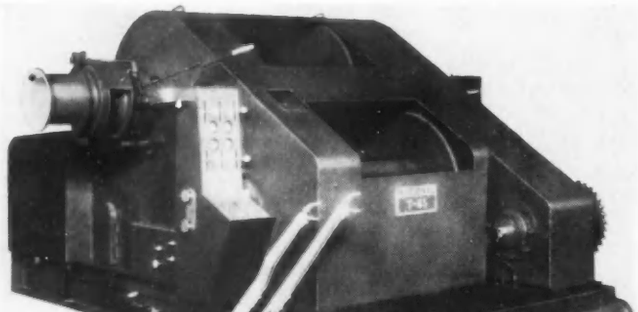
Block 1

NEW PRODUCTS DISPLAYED:



National Type 1625-DE Direct Current Electric Rig, is designed for 16,000 to 25,000-foot depth range, using 1⅜ or 1½ inch wire line and up to 2,500 horsepower. It features a drawworks that can operate from any adequate DC electric power source. Drawworks is basically of one-piece design, on heavy 18-inch beam base, and embodies provision for a sand reel.

Circle No. 1 on Postcard, Page 287



National Type T-45 Rig is designed for conventional operation or trailer mounting, with normal drilling range of 4,500 to 7,500 feet. It is rated at 550 horsepower. The one piece drawworks can be reduced to less than 8 feet by removing drive group, catheads, and air control housing. Transmission includes friction clutches for high-low drive to drum and Hydromatic brake. The catshaft is engaged by an air clutch. Sand reel is optional and includes air jaw clutch which permits rotation of catshaft when sand reel is not in use.

Circle No. 2 on Postcard, Page 287

National "Helicopter Rig" for 10,000-foot depth can be separated into loads suitable for carrying by helicopter. The drawworks transmission is built as separate unit and drive group forms another unit, with the weight of each kept within the 4,000-pound helicopter load limit.

Circle No. 3 on Postcard, Page 287

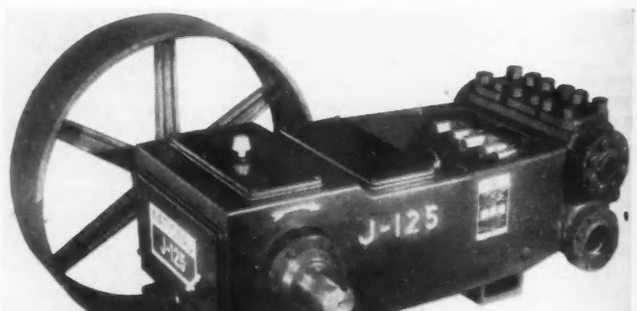
National Model 6 Micromatic Drilling Control is applicable to almost every drawworks, either new or used, regardless of size. It maintains predetermined weight on drill bit, thus relieving driller of much physical effort and the need for constant attention. The Micromatic operates drawworks brake just as a driller does, with drill string under complete control at all times. Weight on the bit can be increased or decreased at any time by adjustment of simple air control, or the Micromatic can be disengaged quickly if necessary.

Installation requires only minor alterations to the drawworks and can be done in the field in about six hours. The control can be removed easily, permitting transfer from an idle rig to a working rig.

Circle No. 4 on Postcard, Page 287

National K-500 Slush Pump, rated at 513 input horsepower, has 7½-inch bore and 15-inch stroke, delivers 755 gpm psi maximum discharge and rated speed of 70 strokes per minute. With 4¾-inch liner it will deliver 275 gpm at 2,735 psi. High structural rigidity is attained in exceptionally light-weight and compact pump by means of welded assembly of shaped and formed steel plates, structurals and steel castings in main frame. Fluid end is one-piece steel casting incorporating new design features. Other features include provisions for quick removal of all parts. Even liner can be removed and replaced through threaded opening in cylinder head, without removing eight nuts that hold cylinder body. Two methods of smoothing out discharge, a conventional 2,150 cubic inch air chamber or new National Pulsation Dampener, are available.

Circle No. 5 on Postcard, Page 287



National J-125 Triplex Pump is designed for waterflooding and salt water disposal, and as power-oil source for subsurface pumping systems. It also is suitable for high pressure testing, gathering service, formation fracturing and acidizing. Rated at 125 input horsepower, pump is available with fluid ends for either low pressure and high volume, medium pressure and volume, and high pressure and low volume, and for either corrosive or non-corrosive service. Suction dampener of diaphragm type is built in, directly below suction valves and running full length of cylinder to provide

optimum dampening effect. Crankshaft is extended on both sides of pump. Plungers and stuffing boxes are readily accessible and can be easily removed.

Circle No. 6 on Postcard, Page 287

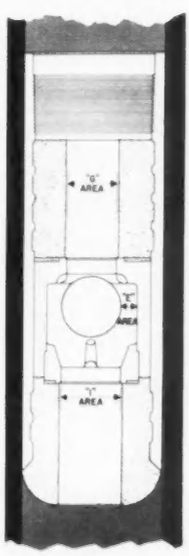
OTHER PRODUCTS DISPLAYED:

National Torque Converters; Type H-1250, K-77, K-500, C-150-B Slush Pumps; Fluid End Parts; Spangweld Drill Pipe; Spang Double Seal Shrink Thread Drill Pipe; Spang Extreme Line Casing; National C-215 Multimatic Rotary; N-1324 Swivel; 654-F-450 500-Ton Universal Hook-Block; Type E Wire Line Anchor; 5¼ inch by 40 foot Hexagon Kelly; National D-3, D-4, E-5, E-11, E-13, E-15, E-21, E-24 Pumping Units; National Wellhead Equipment; National J-125 Triplex Pump; Spang Extreme Line Tubing; Spangseal Tubing; Spang API Tubing.

Larkin and Company, Inc.

Booth 58, California Bldg.

NEW PRODUCTS DISPLAYED:



Float Shoe , C-503

Larkin Cementing Equipment (float shoes, float collars, slim hole centralizers, etc.) is designed to conduct any casing string, regardless of size or length, safely to bottom—and insure proper primary cement jobs.

Circle No. 7 on Postcard, Page 287

Steffan Manufacturing Co.

Booth 29 N

NEW PRODUCTS DISPLAYED:

Steffan Automatic Contour Cutter Model 424 for contouring of pipe without use of templates for straight, mitered or contoured ends. Pipe is cut perfectly, ready for welding on pipe from 4 inches to 24 inches. Also equipped with Heliarc for cutting of stainless, aluminum, moly steel, etc. Optional equipment includes vari-bevelling attachment to change cutting angle. Perfect fit-up every cut.

Circle No. 8 on Postcard, Page 287

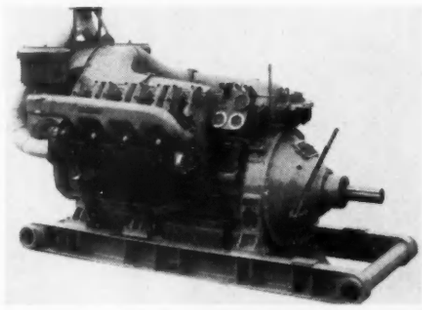
Mechanical Hole Cutter for cutting the mating hole in pipe, tanks or flat planes, also without any templates required. Heliarc attachment also available.

Circle No. 9 on Postcard, Page 287

Davey, Paxman & Co., Ltd.

Block 205, North Area

NEW PRODUCTS DISPLAYED:



Paxman Vega 300 BHP, 8-Cylinder 90° Vee Formation Diesel Engine (Type 8YGA) operates up to 2,100 rpm for automotive applications; 2,000 rpm for intermittent duties; 1,800 rpm for continuous operation. Has power range of 173-466 bhp at speeds of 1,500 to 2,100 rpm. Available in 6 cylinders in line, and 8 and 12 cylinders Vee formation.

Circle No. 10 on Postcard, Page 287

Paxman 6-Cylinder RPH 60° Vee-Type Diesel Engine, arranged as standard oil field generator set. RPH range of engines includes 4, 6, 8, 12, 16-cylinder Vee formation units covering power outputs from 150 to 1,000 bhp at speeds up to 1,500 rpm.

Circle No. 11 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Oil Field Engines; Specialized Engine Sets.

Eisenwerk Wulfel

Block 202, North Area

NEW PRODUCTS DISPLAYED:

Truck-Mounted Hoist AwHL 150/2 with structural mast 60/18 (servicing unit) driven by air-cooled Deutz-diesel engine, 175 horsepower hydraulic torque converter for truck engine driven hoist drums with Aero-clutches, interchangeable individual cushions. Hoist provided for use of powered swivel and tongs.

Circle No. 12 on Postcard, Page 287

Pumping Unit (API floor-clearing type) for 18,500 pounds polish-rod load and 86-inch stroke length with gear reducer API size 320 ratio 35:1, driven by diesel engine.

Circle No. 13 on Postcard, Page 287

Pumping Unit (API floor clearing type) for 6,000 pounds polish-rod load and maximum 48-inch stroke length with gear reducer API size 40 ratio 35:1 driven by electric motor.

Circle No. 14 on Postcard, Page 287

Gear Box API size 228, ratio 35:1.

Circle No. 15 on Postcard, Page 287

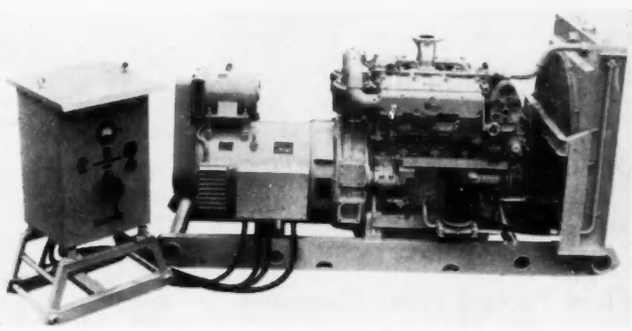
Oilfield Equipment Corp. of Colorado

North of Block 10, North Area

NEW PRODUCTS DISPLAYED:

Mark II Unit Pumper, a crank balanced unit, has speed reducer placed on well side of samson post, and uses propeller type crank which lifts front of walking beam. Mark II permits use of smaller speed reducer and prime mover, gives smooth polished rod motion. One man can adjust pump stroke length easily and quickly. Motor base is pivot mounted type designed for longer V-belt life by keeping belt tension proper and constant. A natural gas volume tank is integral part of skid base. Horsehead alignment jacks permit precise adjustment to compensate for mill tolerance in walking beam. Semi-automatic counter-balance which permits adjustment by movement of lever while pump operates is optional. Four sizes are available, with torque ratings from 80,000 inch pounds up.

Circle No. 16 on Postcard, Page 287



Link-Belt Company

Booths 61, 62, 63, Texas Building

NEW PRODUCTS DISPLAYED:

Spherical Roller Bearings (Series 2220 and 22300) are self-aligning, have heavy inner race flanges, centrifugally cast bronze retainer rings and rugged large diameter rollers.

Circle No. 17 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

FR (Fatigue Resistant) Chains; Wide, Multiple Strand Roller Chains; Silent Chains; API Chains; P.I.V. (Positive, Infinitely Variable) Speed Drive and Parallel Shaft Speed Reducer.

S. K. Wellman Company

Booth 23N, North Area

NEW PRODUCTS DISPLAYED:

Feramic Clutch Facings and Heavy Duty Brake Blocks made from sintered iron base material.

Circle No. 18 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Velvetouch Sintered Brake Lining; Clutch Facings; Cork and Cork Compound Friction Material.

The Wheland Company

South of Block 203, North Area

NEW PRODUCTS DISPLAYED:

Wheland Planetary HP-16000 Slush Pump has several outstanding new features, including: Planetary gear system, perfect circle crosshead and floating input shaft.

Circle No. 19 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Full line of Wheland rotary drilling equipment.

Fluid Packed Pump Company

Block 114, Oilmaster Bldg.

NEW PRODUCTS DISPLAYED:

Fluid Packed Pump's Oilmaster Bottom Hole Assembly for hydraulic free pump installations has cone shaped landing head made integral with standing valve shoe to permit running and landing the parallel string independently of main string. Features include: pressure balanced type seal combined with spring type lock which requires no rotation or other special actuation for seating or unseating. Lock is provided only as a convenience in landing and spacing out, since no amount of hydraulic pressure will unseat the balanced seals. Bottom hole assembly has "tub" type gas anchor with extremely high gas separating capacity. Standard assemblies have proper seal for either Oilmaster or Kobe subsurface hydraulic production unit. Special assemblies are available for free type units of other makes.

Circle No. 20 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Rod-drawn pumps, hydraulic pumps, artificial lift equipment for dually completed wells, pump accessories.

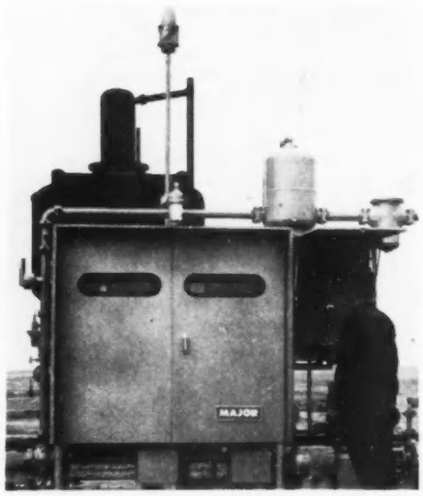
Parkersburg Rig and Reel Co.

Block 8

NEW PRODUCTS DISPLAYED:

Parkersburg Concurrent Glycol Dehydrator (The Might-Mite) is small, compact, skid-mounted unit designed for maximum efficiency at minimum cost. Spherical absorber for 3MM cubic feet per day capacity is no larger than a basketball, yet provides guaranteed dewpoint depression of 65°F. with 100°F. not uncommon. Unit can be shipped completely assembled because of light weight and minimum size. It is particularly suited for offshore platforms because of space-saving design and reduced weight.

Circle No. 21 on Postcard, Page 287



Parkersburg Major Metering Automatic Custody Transfer (MACT) Unit is engineered, packaged, skid-mounted unit which will automatically measure, test, sample, and control oil runs from producer to pipe line. Pre-set clock starts the day's run and cuts unit off when daily run is complete. Oil is pumped from surge tank through strainer, gas eliminator, water-cut monitor probe nipple, sampler nipple, production meter and back pressure regulator, then to pipe line. When month's allowable is run, unit automatically shuts down until run ticket is changed and reset button is pressed. All controls are located in neat tamperproof cabinet which can be sealed. Unit is complete and easily installed in the field in minimum period of time.

Circle No. 22 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Hyhrocarbon recovery and dehydration units, glycol gas dehydration units, oil and gas separators, steel buildings for oil field use, air-balanced pumping unit with automatic balancing device, conventional chain drive and gear drive pumping units, hydromatic brakes for drawworks, new type wellhead pumping device.

J. H. H. Voss Co., Inc.

Booth 77, S & T Building

NEW PRODUCTS DISPLAYED:

Giant Double Deck Reversible Valve for compressors of large displacement. Large port area (72 square inches) and lift area. Heat treated wear resistant materials and corrosion resistant metals used as required by operation.

Circle No. 23 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Voss Compressor Suction and Discharge Valves of any size for all gases and pressures; Valve Plates for any make of compressor valve.

Roto Hammer Company

Block 104

NEW PRODUCTS DISPLAYED:

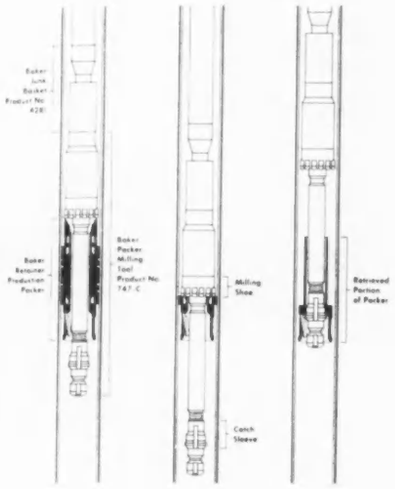
Valve Operator utilizes the impact principal and is applicable to gate and plug valves. It can be hand operated or remote controlled by chain or extension rod, and is an accessory that fits all valves, regardless of brand or age. For plug valve application, automatic lubrication is offered as an accessory to the unit.

Circle No. 24 on Postcard, Page 287

Baker Oil Tools, Inc.

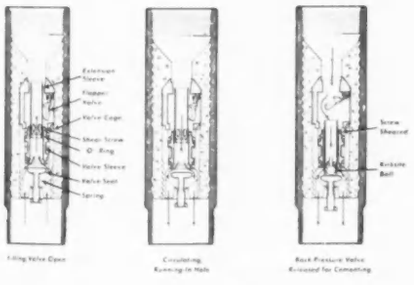
Booths 99, 102, 109, 112, Oklahoma Building

NEW PRODUCTS DISPLAYED:



Baker Packer Milling Tool mills over a retainer production packer in 2 to 4 hours. Usually no part of packer is pushed downhole. After upper outside portion of packer is milled up, the balance of packer is retrieved in over 90 percent of the jobs reported. Can be run on drill pipe or tubing. A Baker junk basket and at least one drill collar, however, should be run between milling tool and drill string. Both milling shoe and bottom sub of milling tool are dressed with hundreds of crushed tungsten carbide chips. After packer is milled over and freed, catch sleeve retrieves the body, guide and junk pusher of Packer. Available to mill over and retrieve most sizes of Baker retainer production packers.

Circle No. 25 on Postcard, Page 287



Baker Circulating Differential Fill-Up Equipment eliminates destructive high-pressure surges, fills casing automatically from bottom as it is run, and allows circulation at any time while running in. When pump pressure is applied, after upper portion of casing is filled to establish circulation, a spring-loaded valve seat moves downward and fluid is allowed to pass through equipment. Flapper-type back-pressure valve may be placed in operation for floating or cementing by dropping kirksite ball and applying pressure to casing after ball has seated in shoe or collar. Three types are available: Circulating Differential Fill-Up Shoe, Circulating Differential Fill-Up Down-Whirler Shoe, and Circulating Differential Fill-Up Collar.

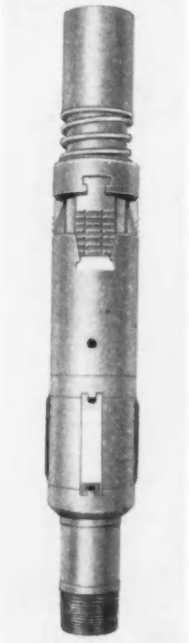
Circle No. 26 on Postcard, Page 287

Baker Retrievable, Snap-Set, Dual Packers feature full-opening bores so that two matching strings of 2⅜-inch O.D. tubing can be run in 7-inch casing. Are actuated by set-down weight only, require no rotation of tubing, can be set and released as many times as required while downhole. Short string can be run and retrieved separately. New packers can be used as upper packer in a two-packer, parallel-string installation. Basic packer is called Model "J" Single-Grip Snap-Set Dual Packer. A double-grip version is the same as basic packer, except that it contains built-in, button-type, hydraulic hold-down. It is used when pressure differentials below the tool are anticipated. Accessories include: Snap-Latch Tubing Seal Nipple or Locator Tubing Seal Nipple for sealing short string in receptacle of packer, and optional accessory which permits addition of tailpipe on short-string side of packer.

Circle No. 27 on Postcard, Page 287

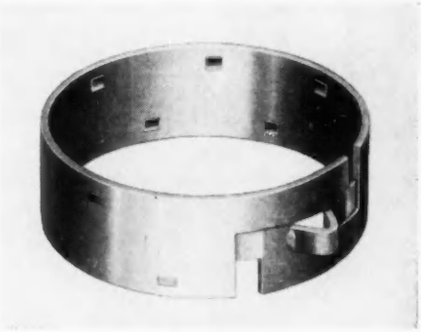
Baker Mechanical Compensating Tubing Anchor does not require application of tension from surface, but is designed to move down the casing as tubing elongates during initial pumping period. It retains the bottom end of tubing in lowermost position. Anchor automatically maintains tubing in right amount of tension to eliminate both tubing breathing and buckling, the prime causes of rod, tubing and pump wear in rod-pumped wells. New anchor is easy to set and release. It also contains shear-ring emergency release in addition to normal release mechanism.

Circle No. 28 on Postcard, Page 287



Baker Tubing Primary Cementing Equipment is used in slim-hole completions where tubing is used in place of casing. Baker Tubing Cement Float Collar serves as float valve when running tubing. Baker Tubing Cement Float Shoe provides balanced combination of strength, valve efficiency, and drillability for safely floating, landing, and efficiently cementing tubing strings of any length. Baker Tubing Cement Guide Shoe efficiently guides tubing past sidewall irregularities and is usually used in combination with Baker Tubing Cement Float Collar. Baker Tubing Fill-Collar with Blowout Control provides automatic blow-out control, yet permits tubing to be filled from the bottom as it is being run. Other Baker tubing equipment includes: Hinge-Lok Tubing Centralizers; Hinge-Lok Tubing Wall Scratchers; Rotating Tubing Wall Scratchers; No-Weld Tubing Stop Rings; and Tubing Metal Petal Baskets with Stop Rings.

Circle No. 29 on Postcard, Page 287



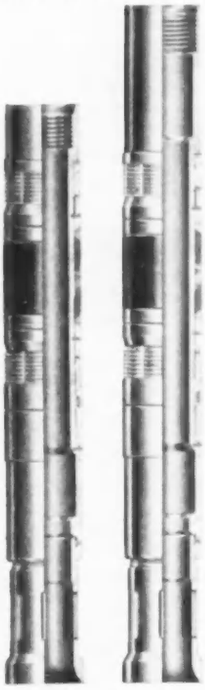
Solid Stop Ring

Split Stop Ring

Baker Hammer-Lok Stop Rings are easy to install and provide strength far in excess of that required to hold strongest centralizer in nearly any open-hole condition. No-weld stop rings can be used to limit travel of reciprocating scratchers, hinged centralizers and solid-ring centralizers. Solid Hammer-Lok Stop Ring can be used on any non-upset casing, while Split Hammer-Lok Stop Ring can be used on non-upset or upset casing. Easy to install, Stop Rings are placed on casing at desired position, then 3-4 lb. hammer is used to drive single upset wedge into Stop Ring until it is flush with O.D. of Ring. Two rows of inserted teeth projecting from I.D. of Ring then grip casing.

Circle No. 30 on Postcard, Page 287

Baker Large-Bore Retainer Production Packers. Model "F" Retainer Production Packer contains bore of constant diameter throughout length of packer body, and is used in completions where larger bore than that provided by Model "D" Retainer Production Packer is required. The Model "FA" Retainer Production Packer contains larger upper sealing bore. With exception of smallest sizes (for 4" O.D. casing), the "FA" is used primarily as upper packer in multiple-packer, dual-zone, triple-zone and quadruple-zone installations. In construction, Models "F" and "FA" Retainer Production Packers are similar to Baker Models "D" and "DA" Retainer Production Packers.



Circle No. 31 on Postcard, Page 287

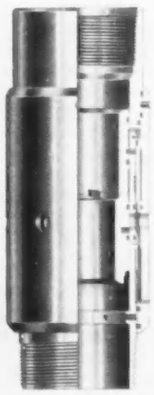
Bakerlok Thread-Locking Compound is used to lock casing joints. In series of tests using 5½-inch O.D., 23-lb., 8 Rd. short thread, N-80 casing and couplings and under bottom-hole temperatures ranging from 50° F. through 400° F., Bakerlok withstood unusual degree of breakout torque. Bakerlok is easily applied. Only circumference of first two-thirds of the pin thread must be covered. Joint is then made up to recommended A.P.I. torque values. Maximum strength is attained in 4 to 10 hours.

Circle No. 32 on Postcard, Page 287

Three Baker Pack-Off Shoes, with packing element and expanding metal rings, have been designed for use in consolidated formations, where the drilled hole is near gage, and all cement slurry must be retained above shoe. This equipment offers same guiding action, circulation, and drillability common to other Baker cementing shoes and is available for three varying requirements. Model "B" Pack-Off Shoe does not contain a back-pressure valve. Model "B" Pack-Off Float Shoe contains flapper-type, back-pressure valve. Model "B" Flexiflow Fill-Up Pack-Off Shoe is similar to Baker Circulating Flexiflow Fill-Up Shoe. All three of Pack-Off Shoes are available for popular casing sizes and open-hole ranges.

Circle No. 33 on Postcard, Page 287

Baker Stage Cementing Collar has two unusual features: First, shut-off sleeve is completely enclosed between body and outer sleeve. Second, each Collar is engineered for the grade of casing in which Collar is to be run. Shut-off sleeve is protected against external or internal interference. It functions equally well in either deep or shallow wells, regardless of hole deviation or other difficult well conditions. Once shut-off sleeve has been closed, it cannot be accidentally moved during drilling out operation or by passage of tools through the Stage Collar.

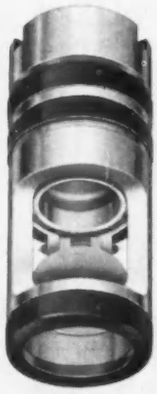


Circle No. 34 on Postcard, Page 287

Baker Tension Tubing Anchor is inexpensive and simple to operate. It is designed to increase production and minimize wear on rods, tubing and casing by eliminating breathing and buckling in rod-pumped wells. Tension is applied by stretching tubing from the surface. Setting and release are accomplished by J-slot mechanism that is actuated by rotation of ¼ turn at the tool. Shear ring is provided for emergency release should this become necessary. Tubing Anchor is available for use in casing ranging from 4½-inch O.D. through 7⅝-inch O.D.

Circle No. 35 on Postcard, Page 287

Baker Full-Flow Drill Pipe Float Valve eliminates drill-collar washout. After two years of research and field testing, Baker engineers have found that drill-collar washout can practically be eliminated through use of drill-pipe float valve containing a flapper valve. Run reports state that there was no severe washout inside drill collar when Drill Pipe Float Valve was run—even under high pumping pressures and fairly high percentages of sand in drilling fluid. When making trips or connections, the drill pipe dries up in one or two stands. Float Valve Puller is available to remove new Float from drill collar.



Circle No. 36 on Postcard, Page 287

Baker Parallel and Triple-String Flow Tubes now available for multiple-zone completions. Both new Flow Tubes seat and seal off in Baker Model "FA" or "DA" Retainer Production Packer which is used as upper packer in many multiple-string hookups. The Full-Opening Parallel Flow Tube is used in two-packer, full-opening, parallel-string hookup or single-packer, full-opening, parallel-string, gas-bleed-off hookup. The Triple-String Flow Tube is used in three-packer, triple-string hookup. Each of the three zones is confined to an individual and isolated tubing string. Quadruple-String Flow Tube has been designed for use in four-packer, quadruple-string hookup, but is still in development stage.

Circle No. 37 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Cement Float Shoe; Cement Guide Shoe; Cement Wash-Down Whirler Float Shoe; Cement Wash-Down Whirler Guide Shoe; Texas and California Pattern Casing Shoe; Differential Fill-Up Shoe; Shoe Screen; Flexiflow Fill-Up Shoe; Triplex Cementing Shoe; Duplex Cement Wash-Down Whirler Float Shoe; Type "E" Circulating Sub; Duplex Stinger Sub; Cement Float Collar; Cement Baffle Collar w/Hole; Circulating Flexiflow Fill-Up Collar; Triplex Flap-

per-Valve Float Collar; Reciprocating Hinge-Lok Wall Scratchers; Rotating Wall Scratchers; Hinge-Lok Casing Centralizers; Solid-Ring Casing Centralizers; Hinge-Lok Rigid Casing Centralizers; and Metal Petal Baskets.

Roto-Vert Casing Scraper; Junk Basket; Rotary Hydraulic Expansion Wall Scraper; Three-Blade Wall Scraper; Standard Cable Tool Core Barrel; Hydraulic Hand Pump; Circulation Joints; Left-Hand Square Thread Sub; Cement Retainer; Wire Line Adapter Kit for Cement Retainer; Stinger Sub for Cement Retainer; No-Left-Turn Latching Sub for Cement Retainer; Wire Line Bridge Plug; Wire Line Adapter Kit for Retainer Production Packer; Tubing Setting Tool for Retainer Production Packer; Retainer Production Packers; Locator Tubing Seal Assembly; Dual-Zone Flow Tube; Latch-Type Packer Plug; Locator Tubing Seal Nipple; Production Tube; Expendable Plug for Retainer Production Packer; Drillable Production Packer; Casing Pump Packer; Retrievable Casing Packer; Tension Packer; Wire Line Pressure Setting Assembly; Wire Line Feeler and Junk Catcher; Open-Hole Wire Line Bridge Plug; Dual Pumping Packer; Snap-Set Packer; Tubing Anchor and Catcher; Full-Bore Retrievable Set-Down Packer; Full-Bore Retrievable Cementer; Unloading Sub; Full-Bore Tubing Tester; Retrievable Bridge Plug; Retrieving Head for Retrievable Bridge Plug; and Open-Side Pipe Vise.

Gruner & Company, Inc.

Booths 24N, 25N, North Area

NEW PRODUCTS DISPLAYED:

Gruner 4-Cone Blue Streak Rock Bits are designed for service in hardest formations encountered in rotary drilling. The four points of contact drill straight holes, and are extremely effective in straightening crooked holes. Additional cutting teeth and bearings assure smooth running and keep hole to gage.

Circle No. 38 on Postcard, Page 287

Reynolds Metals Company

Block 207, North Area

NEW PRODUCTS DISPLAYED:

Reynolds New Heavy Duty End Pipe is designed to put strength at the joint and to eliminate excessive metal in the pipe body. Ends have the same diameter and thickness as steel sizes so steel fittings can be used.

Circle No. 39 on Postcard, Page 287

McEvoy Company, Newman-Hender Company, Ltd.

Booths 91, 92, Kansas Building

NEW PRODUCTS DISPLAYED:

Dual Completion Cutaway Christmas Tree, featuring: McEvoy "DVT" valve, dual valve, integral tee, tubing hangers, McEvoy "Controlled Friction" casing hanger.

Circle No. 40 on Postcard, Page 287

16-inch Newman-McEvoy Pipeline Valve operated by electric operator, and 4-inch Newman-McEvoy gate valve made of Uranus 50 steel.

Circle No. 41 on Postcard, Page 287

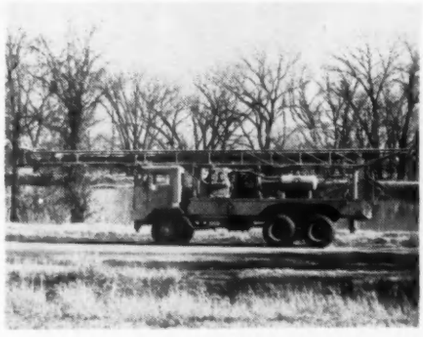
OTHER PRODUCTS DISPLAYED:

McEvoy gas lift valves, tubing hangers, casing hangers.

Geo. E. Failing Company

Block 10, Silver Lane

NEW PRODUCTS DISPLAYED:



Failing Blastmaster is specially designed rig for use of new down-the-hole tools. However, may be used as straight rotary using rock or drag type bits where conventional drilling is desirable. Unit is mounted on Crane Carrier truck Model GF-660, powered with GM 4-71 diesel engine. Air compressor is Le Roi Model 100 S2, air-cooled, 6 cylinder reciprocating type. Standard equipment includes three hydraulic leveling jacks, driller's platform and helper's platform. The two pulldown chains are actuated by hydraulic motor. Power is transmitted through 2-speed transmission and roller chain drive to equalizing jackshaft. Mast is electric welded tubular steel construction with rigid structural sections. Unit has 31½-foot mast, weighs 39,900 pounds.

Circle No. 42 on Postcard, Page 287

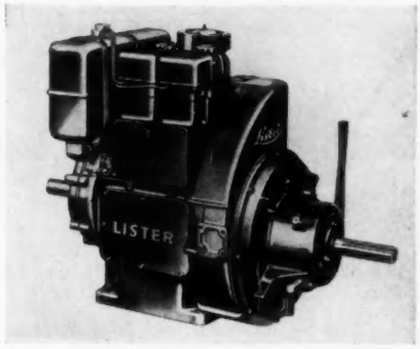
OTHER PRODUCTS DISPLAYED:

Model 90 Stratmaster, 1500 Holemaster, Cfd-1B Combination, Cfd-2 Holemaster.

Lister-Blackstone, Inc.

Booth 15N, North Area

NEW PRODUCTS DISPLAYED:



Lister SL3 Air Cooled Diesel Engine, with hand operated clutch, develops 12¾ bhp at 1,800 rpm. Models ranging from 3½ bhp to 30 bhp are also available. Engines are particularly adaptable for powering generating sets on drilling rigs, direct driving pumps and pumping jacks.

Circle No. 43 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

5KW, 115 volt AC generating set with Lister 2 cylinder air cooled diesel engine.

Wilson Supply Company

Booths 116-117, Okla. Bldg.

NEW PRODUCTS DISPLAYED:

The Wilson "Jet-Powered" Junk Retriever is a modern method of fishing rock bit cones and other junk out of the hole. It has an ejector pump built into the top section of the basket and as the drilling fluid is pumped down through the fishing string, the action of the ejector pump creates a negative pressure within the basket, allowing annular drilling fluid to displace the vacancy. During pumping operation, the junk is forced up into the basket by the flow of the fluid and is trapped by conventional finger-type catchers. As surface pump pressure is increased, pumping action of ejector pump in basket is increased. An especially designed shoe to dig junk from side wall of hole makes recovery of junk easy.

Circle No. 44 on Postcard, Page 287

Cabot Shops, Inc.

Blocks F, 2

NEW PRODUCTS DISPLAYED:

AB-320D-100 Cabot Air Balanced Pump.

Circle No. 45 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Beam Balanced units B-5-25-16D and A14-54-114D Adjustable Crank Unit.

Engineered Oil Tools

Block G, Okla. City Ave.

NEW PRODUCTS DISPLAYED:

Johnston Hydraulic Pumping Unit comprises a complete new line of units, economical for pumping applications from less than 1,000 feet to below 9,000 feet.

The unit consists of a Cylinder Unit and a Power Unit. The Cylinder Unit screws on the pumping tee and reciprocates the sucker rod string, using a conventional bottom-hole pump. The Power Unit contains a hydraulic pump, oil tank and cooler, mounted on a steel plate, and may be driven with any type of prime mover. There are five Cylinder Unit sizes: 2-foot stroke 2,000 pound polish rod load; 3-foot stroke 4,000 pound polish rod load; 6-foot stroke 6,000 pound polish rod load; 9-foot stroke 8,600 pound polish rod load and 12-foot stroke 15,000 pound polish rod load. There are seven Power Unit sizes, with increasing pump sizes and horsepower ratings of 3, 5, 7, 16, 25, 42 and 84.

The Johnston Unit's patented reversing valve eliminates the need of a pilot valve and does not depend upon close machining tolerances for proper operation.

Circle No. 46 on Postcard, Page 287

Hughes Tool Company

Block 106, Skelly Drive

NEW PRODUCTS DISPLAYED:

Hughes bits have undergone several improvements since January, 1957, including:

Hughes OW-J, Jet Tricone Bit for medium hard formations using weights ranging from 2,000 to 6,000 pounds per inch bit diameter, rotary speeds decreasing from 100 to 70 rpm.

Circle No. 47 on Postcard, Page 287

Hughes OSC-J Jet Tricone Bit is more versatile and can drill more efficiently than OSC-1 or OSC-3. It is used to drill unconsolidated shales, red beds and similar formations. Drilling weights range from 1,000 to 5,000 pounds per inch diameter of the bit; rotary speeds from 75-150 rpm.

Circle No. 48 on Postcard, Page 287

Hughes W7R-J Jet Tricone Rock Bit for hard abrasive formations requiring maximum resistance to gage wear. Drilling weights 4,000-7,000 pounds per inch diameter of the bit; rotary speeds 40-90 rpm.

Circle No. 49 on Postcard, Page 287

Hughes OSC-3J Jet Bit, because of widely spaced, deeply cut teeth, is used primarily to drill soft shales, clays and similar formations. Drilling weights range from 1,000-5,000 pounds per inch of the bit diameter; rotary speeds from 85 to 150 rpm.

Circle No. 50 on Postcard, Page 287

Hughes OW Tricone Rock Bit for medium hard formations using weights ranging from 2,000-6,000 pounds per inch diameter of the bit; rotary speeds decreasing from 100 to 70 rpm.

Circle No. 51 on Postcard, Page 287

Hughes W7R Tricone Rock Bit for hard abrasive formations requiring maximum resistance to gage wear. Drilling weights 4,000-7,000 pounds per inch diameter of the bit; rotary speeds 40-90 rpm.

Circle No. 52 on Postcard, Page 287

Hughes OWC Tricone Rock Bit designed to drill formations having high compression strength. Drilling weights 4,000-6,000 pounds per inch diameter of the bit; rotary speeds, 40-60 rpm.

Circle No. 53 on Postcard, Page 287

Hughes R-1J Jet Tricone Rock Bit for extremely hard abrasive formations. Drilling weights, depending on formations, range from 500 to 5,000 pounds per inch diameter of the bit.

Circle No. 54 on Postcard, Page 287

Hughes W7-J Jet Tricone Rock Bit for hard abrasive formations.

Circle No. 55 on Postcard, Page 287

Hughes RG-1 Tricone Rock Bit for longer bit gage life in extremely abrasive quartzitic formations, tacomite and granite formations.

Circle No. 56 on Postcard, Page 287

Hughes OWV Tricone Bit for formations ranging on soft side to "Medium hard," particularly where shales, sandy shales and limestone alternate. Drilling weights range from 1,000 - 6,000 pounds per inch diameter of the bit.

Circle No. 57 on Postcard, Page 287

Hughes W7 Tricone Rock Bit for hard abrasive formations.

Circle No. 58 on Postcard, Page 287

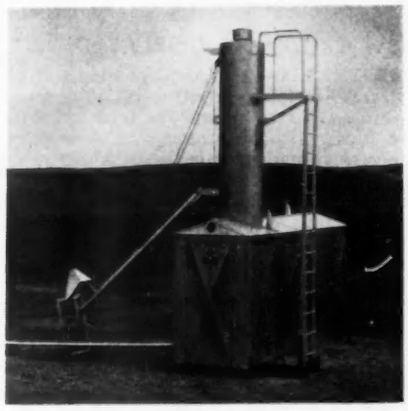
Hughes OSC-1J Jet Tricone Rock Bit is used in firm shales, sandstones and soft lime. Drilling weights 1,000-5,000 pounds per inch diameter of the bit; rotary speeds 85 to 150 rpm.

Circle No. 59 on Postcard, Page 287

Rolo Manufacturing Company

Block V, Silver Lane

NEW PRODUCTS DISPLAYED:



Rolo Calcium Chloride Gas Dehydrator uses calcium chloride pellets in tower of unique design. Patented reflux trays prestrip wet gas by intimate contact with brine in reflux trays, taking advantage of absorption capacity of brine produced by calcium chloride bed. Dehydration process is chemical, requires no process heat. Optional equipment includes isolated indirect heater in skid case to prevent freezing of free water in separator section. Unit is available housed and insulated. One dump valve and control is standard, for removal of free water and spent brine. Interface level control can be added, affording automatic discharge of hydrocarbons. Only moving parts are dump valves and level controls. Optional desiccant loading device is available, reducing recharge time to less than 30 minutes.

Circle No. 60 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

E1-24 Oil Meter, RM1-30 oil meter, 1V-3008W three phase metering separator, Model 50 Rolo calcium chloride gas dehydrator.

Brakesol, Incorporated

Booth 78, S & T Bldg.

NEW PRODUCTS DISPLAYED:

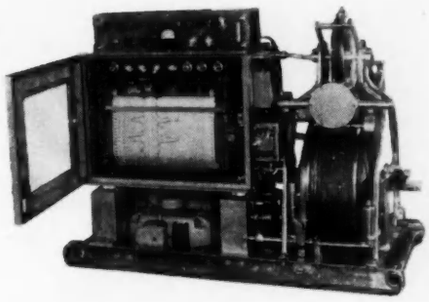
Brakesol, a paraffin treating chemical, is used for down hole treating to prevent the accumulation of paraffin or wax, to reclaim bottoms from pipe line and refinery tanks, and to control paraffin in gathering lines and pipe lines.

Circle No. 61 on Postcard, Page 287

Well Instrument Developing Co.

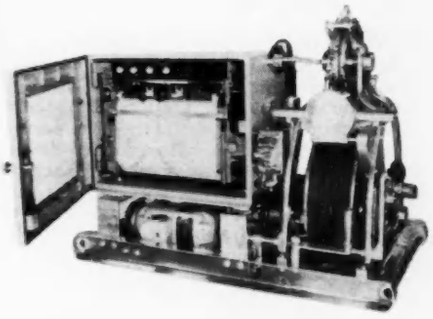
Booths 24, 25, S & T Building

NEW PRODUCTS DISPLAYED:



WIDCO Portable Multiple Electrode Loggers Series V (5,000 feet) is built as complete skid assembly consisting of automatic 2-channel graphic recorder, control panel, cable reel with variable speed hydraulic drive (electrically powered), combination disc-type clutch and brake, automatic cable winder, and miscellaneous accessories. Curves recorded: potential and 3 or 4 resistivities.

Circle No. 62 on Postcard, Page 287



WIDCO Portable 2,000 foot Electric/ Gamma Ray Logger Series X is generally similar to Series V logger except somewhat smaller and lighter. Electric log consists of Potential and Single Electrode Resistivity Curve.

Circle No. 63 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Gamma Ray, Temperature, Caliper Logging Attachments; Casing Collar Locator for WIDCO Loggers; Portable 1,000 Foot Electric Logger (Model Y, Type PR; Fluid Resistivity Kit.

Thornhill-Craver Company, Inc.

Booths 67-72, Kansas Building

NEW PRODUCTS DISPLAYED:

Automatic "High-Low" Safety Shut-Off Valve, which can be manually operated or set by remote control, has no springs, un-balanced piston design. It will shut off at predetermined high and low pressure, and has stainless steel construction for up to 5,000 pounds working pressure.

Circle No. 64 on Postcard, Page 287

United States Motors Corp.

Block 202, North Area

NEW PRODUCTS DISPLAYED:

Micro Power Super Sensitive Standby Generators guarantee uninterrupted power for microwave systems. Units supply instant, "no break" power for automatic boiler room controls, safety devices, meters, telemetering, and other uses. Four sizes, 1.5, 3, 5, and 10 KW output are available for gasoline or gas fuel, and 10 KW rating with diesel engine drive is in production.

Circle No. 65 on Postcard, Page 287

Stardrill-Keystone Company

Block 204, North Area

NEW PRODUCTS DISPLAYED:

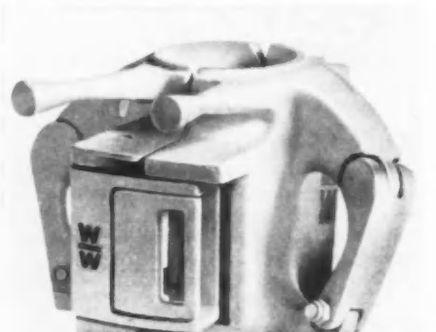
Model KF-50 Rotary Gun Drilling Machine used in exploration and drilling for natural resources. Unit is of modern construction and is designed to secure fullest efficiency from all makes of down-the-hole guns. It is combination machine employing either mud or air, and has sufficient pulldown designed into unit to secure good penetration in difficult drilling areas and insure adequate bit life.

Circle No. 66 on Postcard, Page 287

Web Wilson Oil Tools, Inc.

Booths 87, 88, 123, 124, Oklahoma Building

NEW PRODUCTS DISPLAYED:



'Champion' Center Latch Elevators combine new engineering concepts with modern industrial design. Link arms permit greater compactness while allowing more clearance for installing links. Swept design assures freedom for 'Champion' to roll and turn in the links, even for picking up singles from rig door. Slanted hinge pin provides elevator with natural tendency to close when under load. This tendency actually amounts to several tons, depending upon load, and results in maximum safety. Strong coil spring, located at hinge pin, opens elevator and forces it away from pipe when safety latch is released. Spring also maintains elevator in full-open position until it is latched again. 34 'Champions' are available in capacities from 100 to 350 tons.

Circle No. 67 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Drill pipe slips, hand tubing spider, power spider, links, and other elevators.

IRECO Industrial Division

Booth 12, Park Lane

NEW PRODUCTS DISPLAYED:

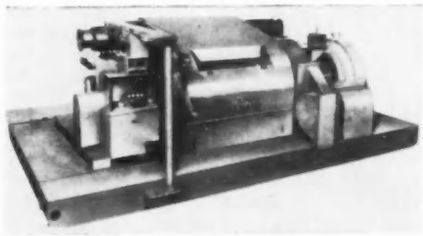
IRECO Line-Lok Couplers supply drilling rigs with low-pressure gas and water Pressure-tight couplings are achieved with two turns, with pipe remaining stationary. Die-cast threads assure ease in assembly and dismantling. Coupler interiors have no obstruction, and insure free flow of any material plus good hydraulic characteristics. Permits 10° to 12° flexibility in pipe line sections. Line-Lok fittings are made of heavy wall aluminum industrial tubing and rustproof maintenance.

Circle No. 68 on Postcard, Page 287

Bethlehem Steel Company

Block 9, Silver Lane

NEW PRODUCTS DISPLAYED:

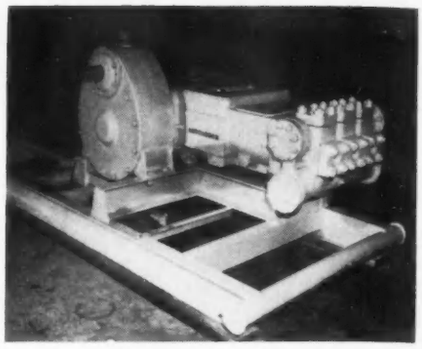


Bethlehem B-3661 Drawworks (36 inch diameter drum, 61½ inches long) is designed for all available types of power —internal combustion engine, electric motor or steam. Drawworks and transmission are built in single frame on common skid only 10 feet wide. Transmissions available provide four speeds for electric motor and steam engine drive, six speeds forward and reverse speed for internal combustion engines. Drawworks features extra large brake rims (64 inches x 12½ inches) roller bearing shafts and sprockets, and filtered forced feed oiling system.

Circle No. 69 on Postcard, Page 287

Bethlehem BCR-60 Rotary Drive Unit is used with ground level or main deck barge mounting of drawworks. Unit allows placing of drawworks and driving elements at low level where high derrick substructure is required. Arrangement permits short drives to drawworks and pumps, and permits driving the rotary table, catheads and sand reels from derrick floor. Rotary table operating speeds may be selected for optimum performance without penalty to pump speed, since drawworks engines are not used for operating rotary table. Remote location of drawworks controls enables driller to be at most commanding location on working floor.

Circle No. 70 on Postcard, Page 287



TP-6 Triplex Plunger Pump

Bethlehem TP-4 and TP-6 Triplex Plunger Pumps are designed to meet present waterflooding requirements. The 4 x 4 Triplex has maximum capacity range of 6,600 bpd at 438 psi to 2,000 bpd at 1,750 psi. The 4½ x 6 Triplex has maximum capacity range of 9,500 bpd at 629 psi to 1,900 bpd at 3,180 psi. Wide operating range is made possible by availability of two fluid ends for each pump. Bethlehem controlled gravity-flow lubrication system provides complete dependability. Fluid ends are available in cast steel and aluminum bronze with ceramic or colmonoy plungers.

Circle No. 71 on Postcard, Page 287

Bethlehem B-1640 Pump is designed for deepest, toughest drilling operations anticipated in the predictable future. The B-1640 (16" stroke, 5,000 lb. maximum working pressure) is large and powerful enough to achieve, unaided, desired rates of penetration, and eliminates necessity for parallel or compound operation of two pumps. Pump is equipped with forged alloy steel fluid end. Features include forged alloy steel fluid ends; bolted type fluid end sections; chrome-plated pistons and extension rods; continuous-weld, fabricated, double-wall, steel frame; oil bath lubrication; and replaceable gear rim and pinion.

Circle No. 72 on Postcard, Page 287

Gustin Bacon Mfg. Co.

Booth 27, Silver Lane

NEW PRODUCTS DISPLAYED:

Rigi-Grip is a new coupling for rigid connection of grooved pipe for working pressures up to 2,000 psi.

Circle No. 73 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Rolagrip; Gruvagrip; Gruvajoint-Couplings for plain and grooved end pipe as well as fittings for plain and grooved pipe systems.

Victaulic Co. of America

Booth 90, Texas Bldg.

NEW PRODUCTS DISPLAYED:

New Style 88 Rigid Coupling is designed for rigidity—non-sag and non-swivel—at connections, easy and fast installations, and complete gasket protection with no exposure or blowouts. Jaw teeth cast in housing-clamps engage the pipe ends and eliminate sag, flex and swivel. Coupling is useful in tank battery work, LACT, field headers, waterflood, manifolds and other oil field piping.

Circle No. 74 on Postcard, Page 287

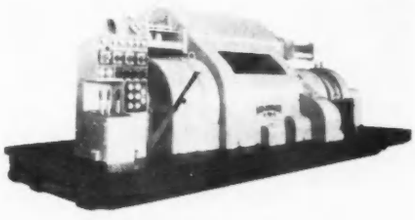
OTHER PRODUCTS DISPLAYED:

Plainlock Couplings and Fittings; Standard Victaulic Couplings for Grooved End Pipe; Y-Insert Gasket for Cement-Lined Pipe; Automatic Cut-Off and Grooving Tool; Vic-Easy Method of Joining Light Weight Pipe; Plastic-Coated Fittings; Stainless Steel and Plastic Fittings.

Mid-Continent Supply Company

Blocks 3, 12, 13, 14

NEW PRODUCTS DISPLAYED:



Mid-Continent's U-712-A Drawworks has operating controls incorporated into new single console, equipped with speed selection levers and air actuated clutch controls. Rated at 700-1,200 net input horsepower, unit is particularly well adapted for heavy duty drilling in medium to deep drilling range in inland or offshore areas. It is designed as single package unit containing hoisting drum, transmission, rotary drive, and auxiliary brake.

Circle No. 75 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Mid-Continent U-914-C, U-1220-B, U-36-A, U-34 drawworks; traveling blocks; rotary tables; 3AE rig drive with exclusive swinging compounds; LS-1420 sectional compound; Delta Dryex dry dessicant adsorption unit; Emsco slush pumps; Cummins engines; Regan crown and traveling blocks; Gray swivels.

Payne Mfg. Co., Inc.

Booths 132, 133, Kansas Bldg.

NEW PRODUCTS DISPLAYED:

Payne Non-Separator Type Accumulators and Desurgers and manufactured in sizes from one gallon to 60 gallons with working pressures to 6,000 psi.

Circle No. 76 on Postcard, Page 287

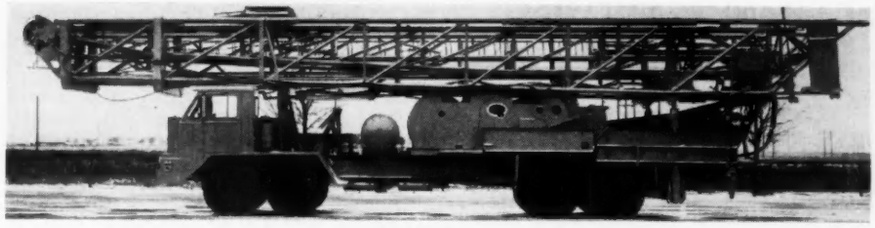
OTHER PRODUCTS DISPLAYED:

Payne Pumps; Payne Non-Separator Type Accumulators and Desurgers; Payne Blowout Preventer Operating Units.

Franks Division Cabot Shops, Inc.

Block Z

NEW PRODUCTS DISPLAYED:



Franks Explorer Well Servicing Unit is powered with 400 horsepower industrial engine. Features include new main drum, water and air cooled brake system, new hardened, removable floating brake drums, fast and safe handling controls. GM, Cummins, Waukesha or equivalent industrial engines are available.

Circle No. 77 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Cruiser and Rocket Series Well Servicing units.

Abegg & Reinhold Company

Booths 3, 4, 5, Silver Lane

NEW PRODUCTS DISPLAYED:

Varco Combination Pin Drive Units—Type KMPC consist of solid master-casing bushings complete with roller kelly bushings. Four drive pins of the kelly bushing engage four drive holes of the master bushing, transmitting an optimum torque with a firm and positive action. All sizes of tubing, drill pipe, drill collars, and casing from 13⅜ in. down to and including 2⅜ in. can be readily handled with the pin drive master-casing bushing. Due to the solid construction of the master-casing bushing, rotary slips receive proper backing, thereby preventing damage to drill pipe, casing or tubing, and all transverse stress to the rotary table is eliminated.

Circle No. 78 on Postcard, Page 287

Varco Integral Tubing Joints—Type HP, have a minimum O.D. (less than API threaded and coupled) and a maximum I.D. These joints have a high torsional strength, and a substantial thread form, offering high resistance to deformation. Because of added clearance, high torque capacity and streamlined contour, joints can also be used to excellent advantage in all types of multiple completions. They are ideally suited for any field that requires a top quality, trouble-free connection.

Circle No. 79 on Postcard, Page 287

Varco Multi-Purpose Safety Clamps—Type MP are manufactured out of forged and fully heat treated alloy steel, insuring maximum safety under all conditions. These clamps can be equipped with handles for use on conventional drill collars and other flush joint tubular products to insure safe handling. They can be equipped with hold down lugs for use in snubbing operations, and can also be equipped with lifting eyes for use in handling large diameter pipe, surface casing, gravel packed liners, and other flush joint tubular products.

Circle No. 80 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Insert kelly bushings, roller kelly bushings, solid master bushings, drill tubing tool joints, casing slips, drill collar slips, rotary slips, tubing slips, and casing bushings.

Wm. W. Nugent & Co., Inc.

Booths 171, 172, Oklahoma Bldg.

NEW PRODUCTS DISPLAYED:

Full Flow Lube Oil Filter has large capacity for filtering lube oil in gas and diesel engines.

Circle No. 81 on Postcard, Page 287

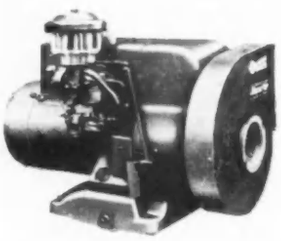
OTHER PRODUCTS DISPLAYED:

Lube and Fuel Oil Filters; Sight Feed Valves; Sight Flow Indicators; Oil Strainers and Other Lubricating Devices.

D. W. Onan & Sons, Inc.

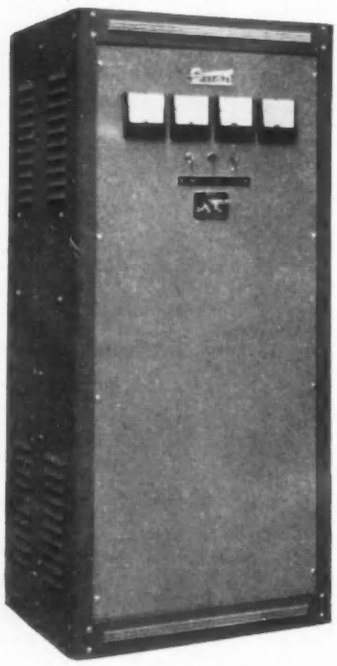
Block T, Onan Building

NEW PRODUCTS DISPLAYED:



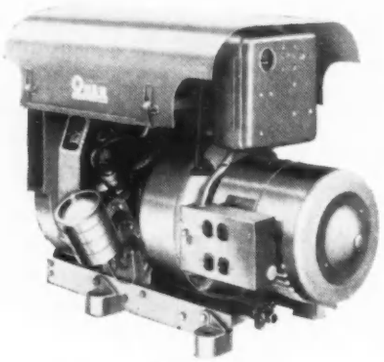
Gasoline-Driven Electric Plant, 1,000 watts, with high 30-amp, 12-volt, D.C. battery charging circuit is designed for charging batteries on work trucks which have high current drain imposed by lights and mobile communications equipment. Provides 1KW of AC also for lights, tools, etc. Onan Model 1AJ-1RV1330 with Vacu-Flo cooling.

Circle No. 82 on Postcard, Page 287



Inverter Power Unit, "Instapac" is designed to supply adequate AC power to operate radio equipment in microwave stations for brief interval required to automatically start standby plant. It operates in conjunction with Onan Emergency Electric Plant and Onan Automatic Line Transfer Control, but can be installed in existing standby equipment with little or no change in wiring. Unit can take over any power load up to 5 KVA within 8 to 28 milliseconds. Unit is transistorized inverter, operating from 36-volt battery system. It provides 1 KVA of standard 115-volt, 60-cycle current. Little maintenance is required, for unit has no moving parts or adjustments.

Circle No. 83 on Postcard, Page 287



Diesel Electric Plant, 3,000 watt, air-cooled, with Vacu-Flo cooling system which makes possible compartment installation with no ventilation problems. Ideal for well logging and communications vehicles. Onan Model 3DSL.

Circle No. 84 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Onan Model 6DRN, 6KW air-cooled Diesel Electric Plant; 5KW Standby Plant with Automatic Control; 10KW Diesel Electric Plant; 2,500-Watt Portable Electric Plant; 100KW Diesel Electric Plant; 50KW Gasoline Electric Plant.

Johns-Manville Sales Corp.

Booths 44, 45, 46, 47, Oklahoma Building

NEW PRODUCTS DISPLAYED:

Metal-On Pipe Insulation, a completely new development consisting of high temperature thermobestos calcium silicate insulation factory-jacketed in gleaming, weatherproof aluminum. The jacket thickness has been designed to provide at low cost, outstanding appearance, stiffness, workability, and resistance to abuse and perforation by pitting. Sections contain effective vapor barrier between jacketing and insulating.

Circle No. 85 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Clutch Facings, Brake Linings, Packings and Gaskets, Pipe Line Wrappings, Corrugated Flexboard, Built-Up Roofing, Fiber Glass Corrulux Panels, Transite Pipe, Celite Filter Aids, Microcel Drying Agent, Thermal Pipe Insulation.

FWD Corporation

Block N

NEW PRODUCTS DISPLAYED:

FWD Teracruzer Eight-Wheel-Drive Cargo Carrier hauls drilling equipment and supplies over virtually all types of terrain—sand, snow, swampland, rough and rocky areas—without need for roads. Payload is 15,000 pounds on fifth wheels. Maximum speed is 29 mph. Can negotiate 60 percent grade fully loaded. Through controls in cab, tires' air pressure can be varied individually from 3 to 15 pounds to suit operating conditions. Engine is 250-hp, 6-cylinder Cummins turbodiesel. Fuller R96 transmission gives 10 speeds forward, two reverse, with direct drive in 10th.

Circle No. 86 on Postcard, Page 287

FWD BX Wheeled Tractor Geophysical Unit is rugged, fast and maneuverable. Basic vehicle is versatile FWD Blue Ox tractor, on which special geophysical drill is mounted. Four-wheel-drive tractor has 182-horsepower gasoline engine, 16.00x20-inch tires and power steering, which combine to give necessary power, traction, flotation and mobility for rugged geophysical exploration. Tractor can travel 45 mph on smooth, level terrain, thus providing fast movement from one location to another.

Circle No. 87 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

FWD BX wheel-tractor-mounted side boom pipelayer.

Plan Hold Corporation

Booth 66, S. & T. Building

NEW PRODUCTS DISPLAYED:

Plan Hold Stack Roll Files permit systematic filing for sheets of any length up to 5 feet wide. File has steel shell with 4 duro-tubes, each 2⅜ inches in diameter, with single spring-latched door. Each unit has stacking rim whereby one unit can be fitted firmly over another. (Slide together models without door available.) These features permit stacking from floor to ceiling. Also one stack can be clipped laterally to another to form single rigid file. Colored label cards are available.

Circle No. 88 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Vertical Filing Equipment; Racks (mobile and stationary); Cabinets; Filing Accessories.

Tubular Lining Corporation

Booth 214, Oklahoma Building

NEW PRODUCTS DISPLAYED:

Baked-On Corrosion Resistant Linings for oil field tubing. From rinse to oven, electronic controls govern every phase of application process. Tubing is moved from caustic, acid and rinse baths by overhead cranes to automatically operated sandblasting machine. The cleaned tubing is carefully inspected with optical instruments. "O.K.'d" tubing is moved along racks to conveyer belt. It is lined and baked in proper sequence for proper length of time on this continuous, automatically controlled conveyor belt until it is properly bonded and cured. The familiar, vastly improved maroon plastic compound is used, but with a new degree of toughness and durability.

Circle No. 89 on Postcard, Page 287

B. F. Goodrich Company

Booth 76, Kansas Building

NEW PRODUCTS DISPLAYED:

"Super Highflex" Rotary Drilling Hose contains more than two miles of cable, made from 41 miles of high tensile strength wire, spiralled inside every 60-foot length. Two plies of extra heavy wire furnish strength needed to withstand extreme bottom hole pressures. Seven plies of fabric add strength. Resilient construction results in a crush-resistant hose that recovers immediately from the effects of sudden shock or impact. It also is available in vibrator hose for conducting mud from mud pump to rig. Hose ends are enlarged to accommodate couplings of the same inside diameter as hose. Ends are further reinforced with additional plies of wire and fabric to protect against bending stress at the couplings. Couplings are built-in and do not move out of position even under severe operating conditions.

Circle No. 90 on Postcard, Page 287

The "Commander" Flexible, Slim Hole Rotary Hose will not "kink off" or collapse in service. It comes with an exclusive reattachable coupling that enables hose to be coupled in the field simply and quickly,, using only a vise and wrench.

Reinforced with more than 10 miles of high tensile strength, heavy steel wire in every 50-foot length, hose is designed especially for slim hole drilling and for use on portable rigs, workover rigs, seismograph and geophysical rigs.

Three braids of multiple-end wire are braided at a precise angle to resist changes in hose length or diameter during high pressure applications. Wire braids are cushioned in oil-resisting rubber. Engineered for working pressures up to 1,000 pounds per square inch, each length of hose is tested to 2,000 pounds and has a minimum burst of 4,000 pounds per square inch.

Circle No. 91 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Rotary Hose; Vibrator Hose; Mud Pump Suction Hose; Seismograph Hose; Geophysical Hose; Gasoline Tank Truck Hose; Steam Hose; Welding Hose; Air Hose; Fuel Oil Hose; Gasoline Pump Hose.

Jet-Lube, Incorporated

Booth 134, Oklahoma Bldg.

NEW PRODUCTS DISPLAYED:

JET-LUBE "Easy-Clean" Rig Washing & Steam Cleaning Compound is a powder, readily soluble in water, for free-rinse cleaning of oilfield equipment and machinery, pumps, tanks, trucks, pumping units and for all general cleaning maintenance. Used in hand-soap dispensers and easy on hands. Non-inflammable and non-toxic. Non-injurious to paint, and, after washing, leaves chemically clean surface. No special equipment nor precaution is required in its use. Equally effective in hard or soft water.

Circle No. 92 on Postcard, Page 287

Jet-Lube "CB-2" Hi-Temp Crown Block Lubricant is manufactured for fast running sheaves of crown and traveling blocks, high temperature anti-friction bearings and journals. A multi-purpose grease of highest quality for all general lubrication of deep-hole drilling rigs. Highly water repellent. Stays put in hot, fast bearings because of its exceptionally high melting point.

Circle No. 93 on Postcard, Page 287

Jet-Lube "No. 9 Improved" Tool Joint Compound contains finely screened special anti-seize and low-friction metallic fillers in highly adhesive waterproof grease. Prevents washouts in clear or mudded-up circulation and protects against salt water corrosion. No. 9 is uniformly conditioned for perfect brushability to assure complete coverage of joint. Withstands highest normal pressures and hole temperatures. Does not harden. Available in 9-pound, 25-pound, 45-pound, and 135-pound containers.

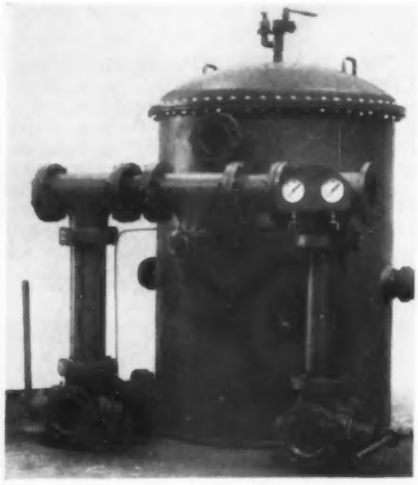
Circle No. 94 on Postcard, Page 287

API High-Pressure Thread Compounds. "Silicone" and "Modified" types are available in 25-pound and 50-pound containers. Label of each product on each container states complete thread-compound composition in percentages by weight.

Circle No. 95 on Postcard, Page 287

Baker Filtration Company
Booth 25, Silver Lane

NEW PRODUCTS DISPLAYED:



Baker BF Filter is vertical type diatomaceous earth filter, utilizing exclusive turbo-jet second stage backwash technique. Saram polyethylene with Dynel covered cloth septa uses new filter chain stitch in Dynel cloth for hydraulic balanced water filtering unit. Due to vertical vessel and turbo-jet second backwash, complete cleansing of tank and elements is accomplished, thus when placed on stream again, no old diatomaceous earth is picked up and re-deposited on septa, which could shorten filter cycle.

Circle No. 96 on Postcard, Page 287

Baash-Ross Div., Joy Mfg. Co.
Booths 24, 25, 26, Texas Bldg. Block 7

NEW PRODUCTS DISPLAYED:

Power Swivel for use in drilling and workover on wells to 10,000 feet can be used to drill either up or down. Full torque of 2,000 pounds can be held on drill string even when struck. Hydraulic powered swivel includes portable power unit consisting of engine drive, hydraulic power pumps, hydraulic reservoir, control components, filter system, and integral forced lubricating system. Control system is remote control station equipped with explosion proof switch gear operating from engine electrical system. Swivel is used in drilling all types of formations and in such sensitive operations as internal pipe cutting, drilling out bridges, drilling out cement after squeeze jobs and scraping liners.

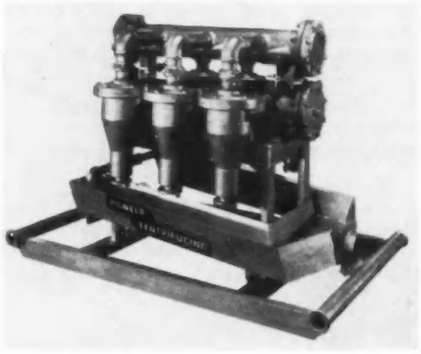
Circle No. 97 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

UCT Dual Completion Wellhead, 50-Ton Traveling Block, Kelley Bushing, Liner Hangers, Cementing Manifold, Slips, Rotary Shoes, Fishing Tools.

Pioneer Centrifuging Company
Booths 19N, 20N, 21N

NEW PRODUCTS DISPLAYED:



Pioneer Desanding Cones and Units are designed specifically for use on drilling muds. Cones are cast with replaceable insert so they may be reconditioned when necessary. Give 100 percent sand separation at low feed pressure—and can be fed by gun line, separate pump or by jet line. Available in two basic sizes: DSC-400-B (4-inch); DSC-600-A (6-inch).

Circle No. 98 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Drilling mud centrifuge, slush pump valves and seats.

Fisher Governor Company
Booths 76, 135, Texas Building

NEW PRODUCTS DISPLAYED:

Type 1603 Central Cyclotest and Well Control System provides complete control of well production and testing for widely dispersed consolidated leases, all from a central location. Used with Type D Cycloprint Data Recording System, complete production and well testing for an entire lease is programmed on central control panel. All test data are automatically stored and printed on permanent adding machine tape with appropriate identification of date, test duration and well number.

High level in test or production separators, low well head pressure and other abnormalities automatically divert wells to a safe condition. Using polarized direct current pulses for both supervisory and data function transmission, the system uses a minimum number of wires compatible with system simplicity, and ease of maintenance.

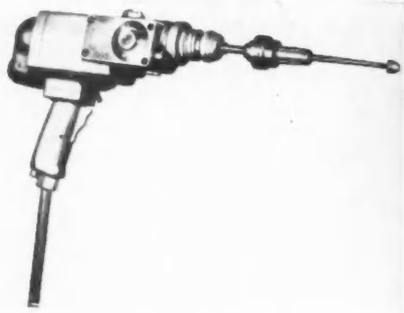
Circle No. 99 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Oil and Gas Valves: Time Cycle Intermitters, Diaphragm Control Valves; Pressure Controllers; Liquid Level Controllers.

Thomas C. Wilson, Inc.
Booths 33, 34, Silver Lane

NEW PRODUCTS DISPLAYED:



Wilson's Torq-Air-Matic Automatic Tube Expander Drive, Model B. Designed for accurate and uniform tube rolling. Suitable for ferrous or non-ferrous tubes ranging up to 1½ inches O.D. Available in three versions, ranging from 38 to 22 ft. lbs torque, and from 450 to 750 rpm.

Circle No. 100 on Postcard, Page 287

Wilson's Portable Pneumatic Grinders. Horizontal and high speed die grinders included in line. Horizontal grinders available in various sizes and models with speeds ranging from 3,100 to 12,000 rpm. Die grinders available in two sizes, 40,000 to 60,000 rpm.

Circle No. 101 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Tube cutting equipment.

Harbison-Fischer

Booths 10, 11, Kansas Building

NEW PRODUCTS DISPLAYED:

H-F Transportable Rod Pump is especially designed for long-stroke (up to 35 feet) hydraulic or beam units pumping from depths of 7,000 feet. The barrel and pull rod are of two-piece construction to allow the pump to be broken apart and carried in two sections. Joints are precision-machined and matched for an exact realignment.

The pump is installed in seating shoes made up at the top and bottom of a pup joint in the tubing string. A bottom lock hold-down seats in lower shoe; a cup-type top hold-down seats in the upper shoe to stabilize pump during operation.

Circle No. 102 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

H-F 3-Tube Rod Pump; Texas Stripper Rod Pump; Flexite Pumps and Plungers; Double-Displacement Rod Pumps; Tuff-Temper and Precision Plungers and Rod Pumps; H-F "Transportable" Rod Pump, a special 40-ft. deep-well pump which can be broken apart and carried on side of automobile; Stuffing Boxes; Polished Rods; Working Barrels; Standing Valves; Special Sucker Rod Couplings.

Charles Bruning Company, Inc.

Booths 62, 63, Kansas Building

NEW PRODUCTS DISPLAYED:

Bruning Copytron Model 1000 Microfilm Blow-back Printer makes working-size enlargements of 35 mm microfilm drawings and records. Utilizing new electrostatic reproduction process, the machine requires no inks, stencils, plates, accessory equipment or developing solutions.

Circle No 103 on Postcard, Page 287

Bruning Copyflex Model 675 has new design features that cut operator fatigue and speeds production. Machine is intended for use in large-scale reproduction of engineering and architectural prints. Like entire Copyflex line, it uses fumeless, clean, quiet Bruning Copyflex diazotype process. Split shade on 7,500-watt lamp provides different amounts of light to two operators who are simultaneously running different types of sensitized materials on same machine. Both roll stock and large sheets can be used. Since Model 675 can be raised or lowered by electrically operated jacks, feedboard height can be set at level most convenient for the operator. Either front or rear delivery is available through simple operation of a selection lever.

Circle No. 104 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Bruning Model 110 Copyflex Machine, Bruning 42-inch Fluorescent Printer.

American Bosch Division American Bosch Arma Corp.

Booths 34, 35, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Magnetos, Hydraulic Cranking Systems, Fuel Injection Equipment, Heavy Duty Ignition.

Hercules Filter Corporation

Booth 10, Texas Drive

NEW PRODUCTS DISPLAYED:

Model 25-CBI "Roto-Jet" Diatomaceous Earth Pressure Leaf Filter Unit, Conical tank 24 inch O. D. and 28 inch O. D., type #316 stainless steel, motorized rotating drive. Within filter will be 10 stainless steel leaves. Pump and motor. Electrically operated or pressure activated valves for semi or fully automatic filtration. Controlled panel. Lucite door.

Circle No. 105 on Postcard, Page 287

Model J/10 Pressure Leaf Filter, steel construction, has five H-channel steel filter leaves covered with 80 x 70 mesh type #304 stainless steel, punched center grid, and 1-inch valve, 1-inch drain, ½-inch vent, one 0-100 gage on pig tail.

Circle No. 106 on Postcard, Page 287

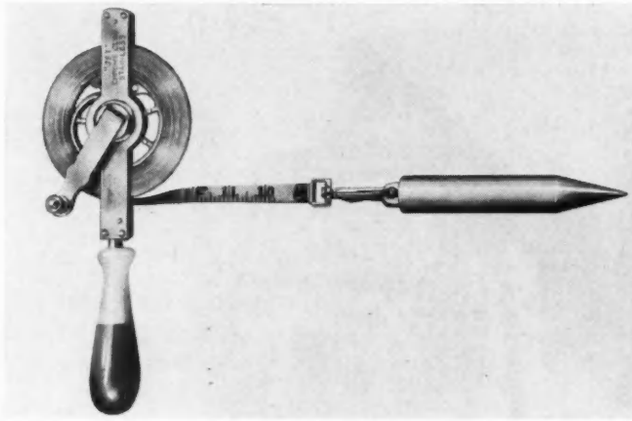
OTHER PRODUCTS DISPLAYED:

H-Channel Filter Leaf; Various Grades of Filtering Asbestos.

The Lufkin Rule Company

Booths 121, 122, Texas Building

NEW PRODUCTS DISPLAYED:



Lufkin "Jet" Chrome Clad Stainless Oil Gaging Tape No. SC1791J is made of spark-resistant materials throughout for use in gaging volatile liquids with low flash point. It has special analysis stainless line with durable, noncorrosive chrome clad finish. A long handle with large drum gives maximum winding leverage and speed. When handle is turned over, it engages frame arms locking line at any desired point, a desirable feature when sounding.

Circle No. 107 on Postcard, Page 287

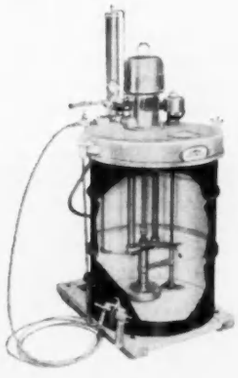
OTHER PRODUCTS DISPLAYED:

Vernier Height Gages, Dial Indicators, Micrometers, Tapes and Rules.

Gray Company, Inc.

Booth 65, S & T Building

NEW PRODUCTS DISPLAYED:



GRACO "Hydra-Spray" for paint spraying eliminates need for atomizing air, heat or excessive solvents. Combination of high fluid pressure and small fluid nozzle is utilized to create fine material breakup without atomizing air, reducing overspray, bounce-back and hazardous fumes to absolute minimum. Because new unit uses specially engineered, air-powered pump that produces fluid pressure 20 times that of inbound air pressure, no heat or excessive solvent is required to reduce paint viscosity to sprayable consistency, resulting in excellent coverage, particularly on structural steel, etc. Being air-powered, pump does not exert pressure in container, eliminates electrical connections and operates only while actually spraying.

Circle No. 108 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

High Volume Grease Transfer Pump.

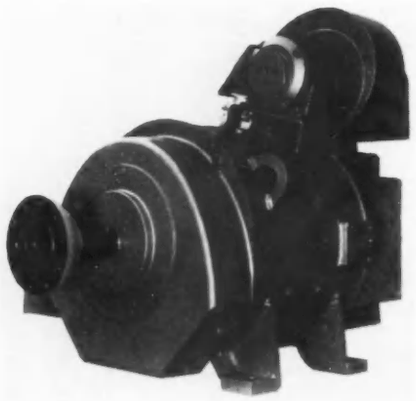
Reliance Electric and Engineering Company

Block 206, North Area

NEW PRODUCTS DISPLAYED:

Reliance Oil Field Pumping Motors, rated from 1 through 50 horsepower, provide high starting torque, absorb electrically wide torque loading encountered during pumping cycle, with minimum current surges at starting and cyclical peaks. Motors are specifically tailored to meet rigors of outdoor operation, as well as handling heavy, fluctuating load. Weather will not corrode frame, shaft or bearings, nor affect windings. Specially constructed enclosure features smooth, cast-iron frame and end brackets, split-iron conduit box with weather-tight neoprene gasket and non-corrosive neoprene shaft slinger. Other features: Reliance Metermatic lubrication with automatic grease relief and metering plate that regulates flow of lubricant to bearings as needed; neoprene gasket with water-tight pressure knobs to protect motor leads; advanced insulation system; and rodent-protective screening for all ventilating openings.

Circle No. 109 on Postcard, Page 287



Reliance 640 PM motor, designed for oil drilling rig duty, is rated at about 300 horsepower. Variable-speed motor can be used with d-c generator receiving power from diesel, LP gas, gas turbine, or other engine serving as prime mover.

Circle No. 110 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Reliance a-c and d-c electric motors, operators' stations and motor controls; variable speed drive products.

American Pullmax Co., Inc. & Piston Products, Inc.

Booths 5, 6, Park Lane

NEW PRODUCTS DISPLAYED:

Pullmax Model P-5 and P-7 Universal Shearing and Foaming Machines, especially designed for maintenance and production departments, offer a newly-developed method of circle cutting, edge bending, square shearing, louvering, flanging, beading, dishing, and slot cutting in metals up to ¼ inch material.

Circle No. 111 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Diesel Engine Piston Rings and Liners.

Pacific Mercury

Booth 21, S. and T. Building

NEW PRODUCTS DISPLAYED:

Pacific Mercury F AC-100 Automatic Load Demand System for PM electric plants up to 4,500 watts automatically starts electric plant when equipment is switched on, automatically turns power off when no longer required. When used with automatic line transfer switch, system also insures complete standby control in case power fails. System automatically takes over when normal power sources fail, shuts off automatically when power is restored.

Circle No. 112 on Postcard, Page 287

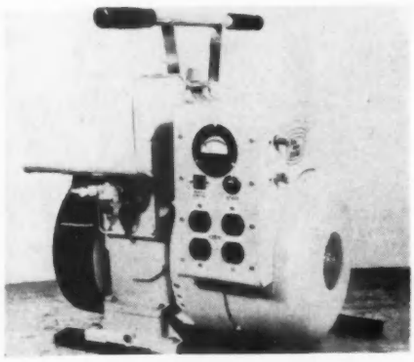
Pacific Mercury Flasher Warning Lights include transistorized neon light. All lights in new line have epoxy encapsulated cartridge with patented circuit. Lights are available with PM Solarstat that automatically turns lights on when sun sets, turns them off when sun rises. No manual attention required.

Circle No. 113 on Postcard, Page 287

Pacific Mercury Solo Concrete Vibrator utilizes low amplitude and high frequency vibration. It is one-man operated, and uses standard current. Bearings are eliminated. Vibrating device achieves dynamic imbalance by mechanical tapered finger that keeps counterweight in tract. Motor is in head of vibrator. Load on center shaft is tortional; no eccentric load is applied to motor, nor is flexible shaft used. Concrete as stiff as one-inch slump can be handled with ease, and one man can operate machine even on heaviest

jobs. Vibrator is available in two basic motor sizes and with 1½-inch or 2½-inch diameter head. Casing available in 7, 14 or 21 feet.

Circle No. 114 on Postcard, Page 287



Pacific Mercury Electric Plants, Models 3500 AS and 4500 AS, 120 volt, single phase, can utilize entire capacity from one outlet or can be distributed among four outlets with which units are equipped. Excellent for operation of concrete vibrators, radial saws and similar equipment, models include such features as: Built-in rpm meter with red and green color indicators to simplify governor adjustment and insure full power output, electric starter, shock-absorbing feet, built-in carrying handles, battery charger, extra plug-in receptacles, and four-cycle, air-cooled engine.

Circle No. 115 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

PM Electric Plants and Flasher Warning Lights, Barricades for Construction Projects and Danger Zones; Automatic Load Demand System for use with PM Electric Plants.

Union Tank Division, Butler Mfg. Company

Block H

NEW PRODUCTS DISPLAYED:

Packaged Gas Distillate Separator for high ratio wells uses steam from steam generator to heat separated liquids and allow separation under low, hydrateforming temperatures for increased distillate-recovery rates. Thermostat controls steam flow to heating coils. It allows automatic compensation for production-rate or climate changes. Steam is supplied to heating coils in second-stage separator to keep liquid produced warm, and to speed separation of distillate and water. Steam also is used in well-stream preheater to regulate well-stream inlet temperature to first-stage separator. The preheater is also thermostat-controlled. An indirect line heater upstream of the R-Tic-Cycle separator unit is seldom needed.

Circle No. 116 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Volumetric-Type Liquid Meter for produced oil or water; Glycol-Type Gas Dehydrator with integral inlet scrubber.

Thornton-Mills Mfg. Corp.

Both 3N, North Area

NEW PRODUCTS DISPLAYED:

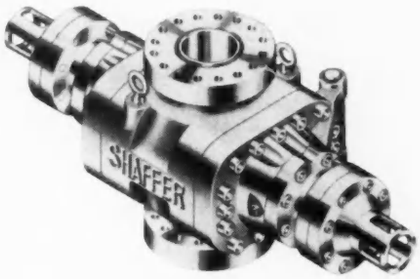
T-M Swivel Joints in pipe sizes from ⅜ inch through 12 inches: in aluminum bronze, iron; also 1,000, 6,000 and 15,000 steel operating pressures for temperatures from —329° F. to 550° F.

Circle No. 117 on Postcard, Page 287

Shaffer Tool Works

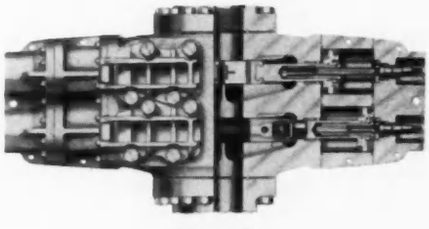
Booths 1, 2, 76, 135, Oklahoma Building

NEW PRODUCTS DISPLAYED:

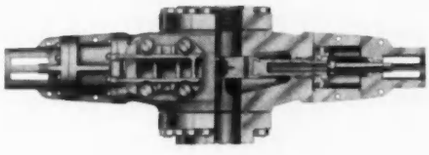


Shaffer XHP Hydraulic Large Bore Blowout Preventers are designed to control extra high well pressures. In 7 1/16 inch bore size, XHP has safe working pressure of 15,000 psi (22,500 psi test pressure). In 9-inch and 11-inch bore sizes, unit has safe working pressure of 10,000 psi (15,000 psi test pressure). Unusually simple in design, XHP has no yokes, levers or other connections between each ram and its operating piston. Other features: "Swinging end-opening" ram changes without loss of operating fluid, positive "in-line" ram and piston design, built-in hydraulic lines. All XHP sizes can be assembled in single or double hook-ups to meet individual requirements.

Circle No. 118 on Postcard, Page 287



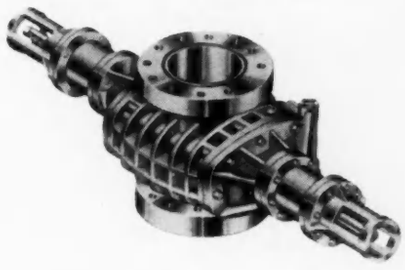
Type B



Type E

Shaffer Type B and Type E Blowout Preventers are designed for wells where normal pressures are encountered. Type B has non-rising locking shaft for installations where maximum compactness is desired. Type E has rising locking shaft where quick indication of ram position is desired. Both types feature "swinging side opening" ram changes without loss of operating fluid, and positive "in-line" ram and piston design. 7 1/16-inch through 15½-inch bore sizes are available in both single and double gate designs.

Circle No. 119 on Postcard, Page 287



Shaffer 7-inch Type LWS Hydraulic Double Blowout Preventer is lightweight cellar control gate designed for pressure protection on quick "in-and-out" production and rework operations. Features include: precision alloy steel casting, "swinging end-opening" ram changes without loss of operating fluid, positive "in-line" ram and piston design. Rams can be opened and closed in 15-20 seconds, using portable hand pump—can be opened and closed in two seconds using power driven hydraulic systems. Available in 7 1/16-inch bore size in both single and double gate designs.

Circle No. 120 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Shaffer 21-inch Hydraulic Single Blowout Preventer, Shaffer GE Hydraulic Double Blowout Preventer, Down-hole Drilling and Fishing Tools, Shaffer-Waggener Bumper Safety Joint, Shaffer "Oil-Sealed" Jar and Safety Joint, Straight Pull Jar, Casing Joint, Kelly Cocks, Adjustable Flow Beans, Rotating Blowout Preventer and Stripper, Mechanically Operated Blowout Preventer, Landing and Casinghead Equipment, Tubing Head Hook-ups.

Metallurgical Products Department, General Electric Company

Booths 241, 242, 243, 244, Oklahoma Building

NEW PRODUCTS DISPLAYED:

Carboloy Cemented Carbide gives reliable service life to seal rings, pump liners, plungers, and ball and seats. These component parts are often subject to early failure because of wear, corrosion, erosion or oxidation. They frequently operate 20 times longer before replacement when equipped with Carboloy Cemented Carbide. This metallurgical product is harder than hardest steel, up to three-and-a-half times more rigid, has compressive strength several times that of heat treated steel and is highly resistant to attack by most corrosive materials.

Circle No. 121 on Postcard, Page 287

Spang & Company

Booths 44, 45, 60 and 61, Calif. Bldg.

NEW PRODUCTS DISPLAYED:

Fabricated Star Drilling Bit is used for drilling large diameter holes.

Circle No. 122 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Cable Tool Rope Sockets; Drill Bits; Drilling Jars; Fishing Tools.

Christensen Diamond Products Co.

Booths 1, 2, Silver Lane

NEW PRODUCTS DISPLAYED:

Christensen Diamond Turbo-Bits can absorb and effectively utilize the turbodrill's increased downhole power, can withstand high rotational speeds and increased fluid volumes. This type of bit, long known for its inherent long life, can increase penetration rates and rotational speeds increase.

Circle No. 123 on Postcard, Page 287

Christensen Rubber Sleeve Core Barrel is designed for coring unconsolidated formations. Features include: continuous, undisturbed core in unconsolidated formations, conglomerates or badly fractured rock; holds loose core together, thus preventing any wedging which might block inner tube, thus allowing barrel to fully advance; protects core from damage caused by moving fluid; and packages unconsolidated core so it can be easily handled and transported with minimum amount of disturbance. Barrel operates at end of conventional drill string and is rotated by rotary table. Source of weight for cutting core is provided by circulating fluid which exerts pressure on nozzle plate. Diameter of barrel is 6⅞ inches O.D. and 3 inch core size. Barrel is available in 38-foot lengths and takes 20-foot core. Diamond bit size ranges from 7½ inches O.D. to 9⅝ inches O.D.

Circle No. 124 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Diamond Core Bits, Drilling Bits, Washover Shoes, Turbo Bits, Core Barrels, Wireline Bits, Reamers, Rubber Sleeve Core Bits.

Caterpillar Tractor Co.

Blocks C & E

NEW PRODUCTS DISPLAYED:

D7 Series D Tractor features greater power, low maintenance requirements, high lugging ability, and the turbocharged engine develops 140 flywheel horsepower, 9 percent greater than its predecessor. Drawbar has been increased from 102 to 112.

Significant to increased production is its 19.6 percent increase in drawbar pull as the engine lugs down, 80 percent greater than the previous Caterpillar D7.

Other features include Caterpillar's dry-type air cleaner, lifetime lubricated track and carrier rollers and idlers, full flow filtration of transmission oil and greater beam strength of final drive gears.

Circle No. 125 on Postcard, Page 287

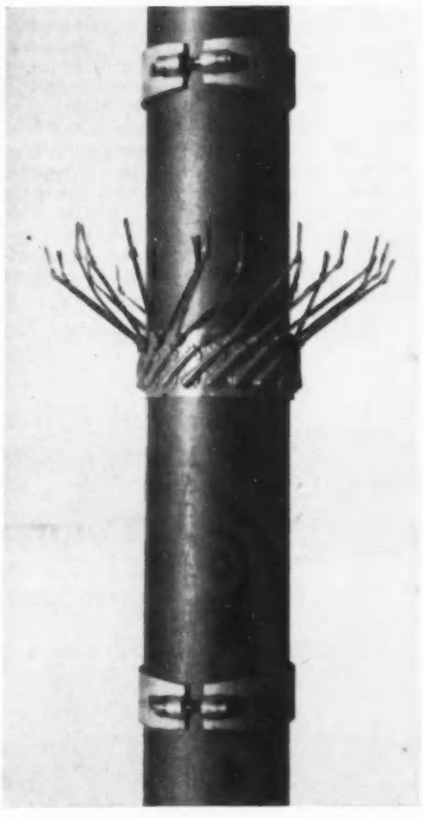
OTHER PRODUCTS DISPLAYED:

Caterpillar No. 583 Series H Pipelayer; D9 Tractor with Kelley Ripper; D6 Tractor with Balderson Blade and Cat No. 6 Ripper; D311 Electric Set; D311 Twin Arc-Welder; D342 Spark Ignition Engine; D397 Diesel Engine; D318 Marine Engine.

B & W, Incorporated

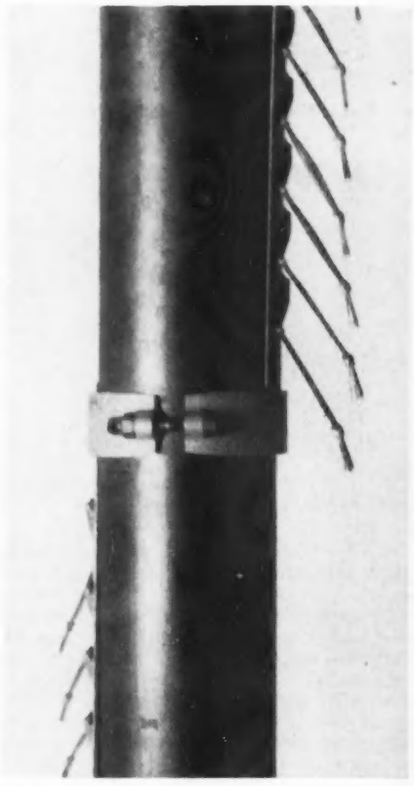
Booths 2, 3, Park Lane

NEW PRODUCTS DISPLAYED:



B & W Friction-Lock Clamp is new device for mounting scratchers and centralizers on casing during cementing operations. Clamp does not slip or damage casing, and undergoes minimum wear. It can be used as central stop for centralizers, or to control placement of scratchers.

Circle No. 126 on Postcard, Page 287



B & W Rotator Clamp enables rotating scratchers and similar cementing tools to be mounted easily and quickly. It locks into position adjacent ends of two lengths of B & W Scratchers. Clamp can be installed with power impact or ratchet hex wrench. It will not slip or damage casing.

Circle No. 127 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Multi-Flex Scratchers, Nu-Coil Scratchers, Multi-Flex and Nu-Coil Rotating Type Scratchers, Automatic Stop Collars, Stabilizers, Liner Centralizers, Latch-On and Solid-Type Centralizers, Combination Scratcher-Clamp Units, Combination Scratcher-Centralizer Units, Thread-Lock Gages, Thread-Lock Cement.

Harley Sales Company

Block 4

NEW PRODUCTS DISPLAYED:

5707 Myers High Pressure Salt Water Reciprocating Pump provides practical and efficient means for salt water disposal. Unit is powered by Model AEH Wisconsin air-cooled heavy duty engine, is equipped with all safety features and guards. Engine may be operated with natural gas or gasoline.

Circle No. 128 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Wisconsin Engines; Roper Rotary Pumps; Deming Salt Water, High Pressure, Triplex Pumps; Ampco Aluminum Bronze Centrifugal Pumps; Goulds Simplex Reciprocating Pumps, Worthington Triplex Reciprocating Pumps.

Kobe, Incorporated

Booths 217, 218, 233, 234, Okla. Bldg.

NEW PRODUCTS DISPLAYED:

Kobe Single Well Hydraulic Pumping Unit consists of high pressure pump, prime mover, small tank, plus controls all mounted on a small skid base. Can be set on wood sills at wellhead and with simple connections is used to operate Free Pump equipped well. Eliminates need for long power oil lines and requirement for settling facilities at tank battery. Unit designed for simplified well testing and gaging and provides easy method of controlling paraffin deposition in tubing and flow lines, permits economic hydraulic pumping installation and provides flexibility in transferring equipment. Simplifies running and surfacing of the Free Pump, which eliminates the requirement for pulling crews to change bottom hole pumps. Suitable for most wells as regards volume, depth, water cut, viscosity, or gas/oil ratio.

Circle No. 129 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Single Well Hydraulic Pumping Unit; Automated Hydraulic Pumping System; High Volume (to 1,800 B/D) Hydraulic Pump; Dual Zone Hydraulic Pumps; Free Pump Bottom Hole Assembly; Free Pump Wellhead.

W. C. Norris

Block 5

NEW PRODUCTS DISPLAYED:

RB Series

MB Series

Norris 6" RB and MB Series Wafer Type Butterfly Valves. Type RB is rubber seated with aluminum bronze disc. Type MB is metal seated with aluminum bronze disc. Both are available with ductile iron, or stainless steel discs.

Circle No. 130 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Sucker Rods, Well Heads.

BJ Service, Inc.

Block 204

NEW PRODUCTS DISPLAYED:

BJ Pacemaker Triplex Pump has 20 bpm maximum delivery rate, handles up to 1,000 hp input. Using 4½-in. plungers, unit has pressure rating of 12,500 psi for testing lines, and 8,000 psi for continuous operation. With smaller plungers, pump can test lines at 20,000 psi. This performance has been made possible by stepping up maximum rpm to 1,200.

Circle No. 131 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Casing floating equipment, retrievable packer, pump-down jet gun, cement pump truck.

Scott Industries, Inc.

Booth 79, Kansas Building

NEW PRODUCTS DISPLAYED:

"Designing in 3-D", the use of do-it-yourself scale models for solution of sales and design engineering problems, is practical on a convenient, economical and simple basis. One complete, nation-wide source of supply for everything needed to apply industrial scale models, including a national network of Affiliated Model Shops having more than 600,000 square feet of shop space.

Circle No. 132 on Postcard, Page 287

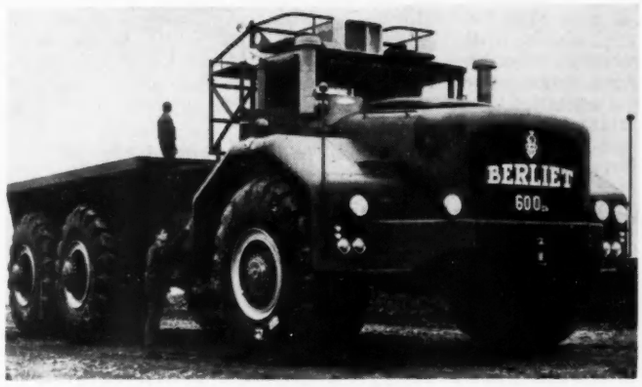
OTHER PRODUCTS DISPLAYED:

Examples of "Designing in 3-D" of Process Plants; Industrial Plant Layouts; Product Design; etc.

Automobiles M. Berliet

Block 12, North

NEW PRODUCTS DISPLAYED:



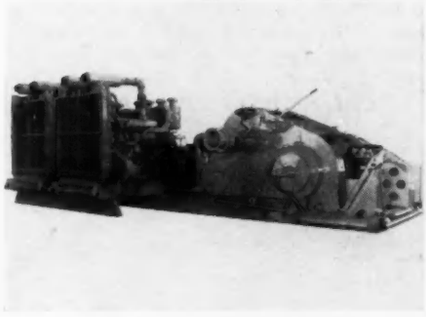
Berliet 100-Ton Truck has 600 horsepower turbo-diesel engine designed for oil exploitation in Sahara Desert. As off-the-road carrier, it can carry indivisible loads up to 100 tons on desert sand and other types of hazardous terrain. Its tires, 8 feet in diameter, carry pressure of 14 pounds per square inch, the same as camel's feet. Shock-absorbing suspension, power-assisted controls, air conditioned cab make driving easy and comfortable on rough trips under any weather conditions.

Circle No. 133 on Postcard, Page 287

Cardwell Manufacturing Co.

Blocks Q, N, R, Oklahoma Drive

NEW PRODUCTS DISPLAYED:



Cardwell Model J700 Two or Three Engine Draw Works provides versatile torque-converter driven unit for economical, heavy-duty drilling in 5,000 to 9,000-foot range, using 4½-inch drill pipe. Nominal input rating is 700 horsepower; with two or three engine compound having 850 horsepower continuous rating, to provide 600 horsepower continuous torque converter output at pump drive. Three speeds forward and one reverse are provided to main drum and rotary drive through chain transmission with mechanically-shifted gear clutches. Air-operated master clutch and brake are provided. J700 is adaptable to variety of mountings, including multiple trailer masts, and will accept any engine in suitable horsepower range. Engine compounds for high and low speed engines are available to provide maximum drive efficiency.

Circle No. 134 on Postcard, Page 287

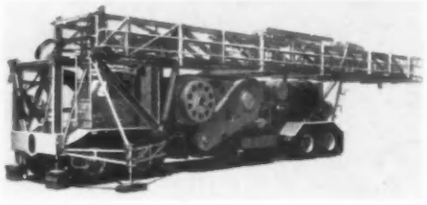
Cardwell "Hustler" Self-Propelled Servicing Unit has fast operating speeds, minimum weight without sacrificing strength, and rugged dependability. Designed for servicing and workover in 10,000-foot range with 2½-inch tubing, the compact double-drum hoist is carrier-engine powered through heavy-duty Cardwell bevel gear box. Five forward and one reverse speeds are made available to hoisting drum, sand line drum, cathead shaft

and rotary drive when specified. Nominal input is 230 horsepower. Fawick Air-Flex friction clutches are used outboard-mounted on main drum and inboard-mounted on sand line drum. Telescoping, 65-foot single-leg Cardwell pipe mast has 100,000-pound hook load capacity with 4 lines. Standard equipment includes remote controls for mechanical transmission and bevel gear box. Ground operation control panel is located at right hand front position; with separate sand drum controls operated from platform at skid level position.

Circle No. 135 on Postcard, Page 287

Cardwell "Nomad" Self-Propelled Servicing Unit features powerful double-drum servicing hoist, mounted on Cardwell self-propelled carrier with 65-foot Cardwell single-leg pipe mast or 100-65 structural mast. Depth rating for well servicing is to 5,000 feet with 2½-tubing. Nominal input is 160 horsepower. Hoist is powered by industrial-type carrier engine through heavy-duty Cardwell bevel gear box. Three forward and one reverse speeds, plus infinite number of converter speeds, are made available to hoisting drum, sand drum, cathead shaft, and tandem axles of carrier. Cardwell Flex-Disc air friction clutches are used throughout. Telescoping mast has 100,000-pound hook load capacity. Remote controls are provided for operator convenience either at ground or carrier-bed level, and folding operator's platform is located back of carrier cab.

Circle No. 136 on Postcard, Page 287



Cardwell Model KM250, newest member of Travelrig Series, is self-propelled, drive-in unit designed for servicing and workover to 15,000 feet. Consisting of single-drum or double-drum hoist and choice of 90-foot or 96-foot telescoping structural mast, mounted on special heavy-duty carrier, the KM250 is built to stand up under toughest roading and field conditions. Hoist is powered by single oilfield-type engine with torque converter. Six speeds forward and one reverse are available to main drum; three forward and reverse speeds to sand line drum. Double-end main drum drive is provided, with high and low clutches outboard mounted for easy accessibility. Free-standing Cardwell 90-foot mast has hook load capacity of 170,000 pounds, and 96-foot version has hook load capacity of 180,000 pounds. Rotary drive and hydromatic brake are available as optional equipment.

Circle No. 137 on Postcard, Page 287

Cardwell Model V700 Quadruplex Plunger Mud Pump is compact 700 horsepower slush pump with rated speeds of 220 spm maximum and 80 spm minimum. Has operating range of 3,500 to 1,410 psi with volumes of 190 gpm to 725 gpm. This is accomplished by using 6, 5, 4, or 3 inch plungers. When plunger sizes are changed, fluctuations in discharge flow are not increased, as is the case when liner bore is reduced on double acting pumps. Features include: High speed design, V-type construction, short stroke and precision gearing which permits direct coupling of electric motors or engines at 900 rpm V-belt. Chain drive may also be used. Model V1500, largest in Cardwell's new line of V-type pumps, is now in full-time use on both land and barge installations.

Circle No. 138 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

L 350 and J 450 Drilling Rigs, V 1500 Slush Pump.

Manzel, Unit of Houdaille Ind., Inc.

Booth 50, Oklahoma Building

NEW PRODUCTS DISPLAYED:

Manzel Lube-Line Alert is a lubrication alarm system used as a protective device on force feed lubricating systems. Is installed at lubrication terminal point by cutting the line and connecting the fittings. The unit is connected electrically to any warning device, and will indicate a lack of lubricant flow, regardless of causes. It can be used for pressures up to 10,000 psi and is available in explosion-proof models.

Circle No. 139 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Chemical Feeders; Force Feed Lubricators; Slurry Pumps; Various Controls for Lubricating Systems.

The Brewster Company, Inc.

Block 10, Silver Lane

NEW PRODUCTS DISPLAYED:

Brewster N-20 Drawworks is designed for deepest wells. New flexibility of power offers complete convertibility from mechanical to electrical or torque converter drive, three-load moves for land operations and remote power arrangement for barge or platform work. The N-20 highlights such practical features as: Shorter and fewer chains, fewer shafts and bearings, outboard clutches for easy servicing, high and low rotary speeds independent of transmission, integral drawworks transmission, easy-vu control panel, simplified mechanical parts, three-engine drive to pumps with only two moving chains. With 2,000 recommended available horsepower, N-20 drills from medium depths to 24,000 feet.

Circle No. 140 on Postcard, Page 287

Brewster 8-SX Oilbath Swivel combines new high capacity, 400 tons, with low upkeep, slip-out packing cartridge and easy-to-replace packing. Brewster-engineered extras include extra heavy duty main bearing, two oversized alignment bearings, adjustable ball-type thrust bearing, circulating oilbath design and streamlined cast steel body.

Circle No. 141 on Postcard, Page 287

Brewster RSH 27½-inch Rotary Table for offshore and heavy duty drilling. Capable of handling larger diameter casing programs, Oilbath rotary will handle drilling strings on any depth well. Rugged in design, it has no complicated parts or delicate adjustments. Every component is completely sealed against mud and foreign matter, and is lubricated with Brewster's Lubri-port ends. Rotary is inclosed in

steel housing, preventing distortion under heavy loads and maintaining exact alignment of gears.

Circle No. 142 on Postcard, Page 287

Brewster 500-Ton Traveling Block, designed for deep wells, is perfectly balanced with low center of gravity, falls straight without weave or wobble. Built-in operating safety includes rounded edges, countersunk bolts and pins, sheave guards made flush with block face, and powerful oversize parts. Alloy steel construction gives maximum strength and weight with slim design. Timken roller bearings eliminate side thrust on sheave hubs. Each sheave receives individual grease lubrication through rifle drilled grease passages.

Circle No. 143 on Postcard, Page 287

Brewster N-85 Drawworks, a 10,000-plus foot drilling rig, combines portability and fast operation with Brewster's "Reserve Power" features. Designed for 850 horsepower, it may be furnished with two or three engine compounds and is available with direct mechanical, fluid coupling or torque converter drive. High and low clutches are mounted outboard on drum shaft and may be serviced or replaced without entering the drawworks housing. Using Brewster's Graduated Power Transmission, N-85 has choice of eight hoisting speeds and two reverses. Pump drives, pedestal mounted at rear of compound, are available in single or dual arrangements, may be actuated singly or together from drawworks control panel. Every drilling operation is air controlled from highly simplified control panel on main skid. Entire rig may be moved in three over-the-road packages.

Circle No. 144 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Christmas trees.

Bonney Forge & Tool Work

Booths 32, 33, Oklahoma Bldg.

NEW PRODUCTS DISPLAYED:

Bonney Sweepolet Fitting is a forged, integrally reinforced, insert butt welding pipe fitting especially designed for applications on high yield pipe. Fittings assure maximum efficiency of metal placement with minimum weld; optimum distribution of stresses due to internal pressure and externally imposed loads.

Circle No. 145 on Postcard, Page 287

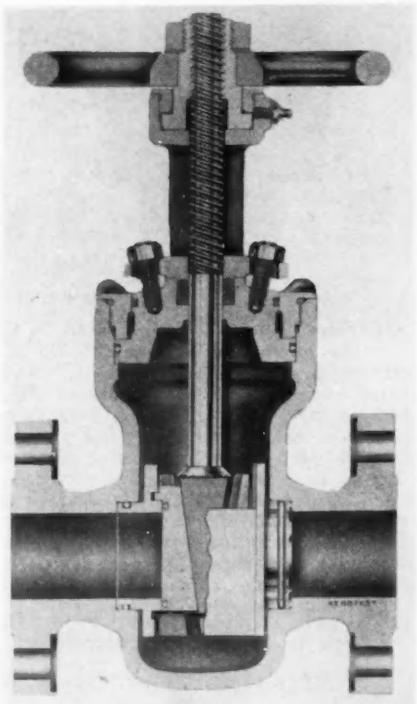
OTHER PRODUCTS DISPLAYED:

Weldolets; Thredolets; Sockolets; Elbolets; Brazolets; Hangolets; Forged Steel Screwed and Socket Welding Tees and Elbows.

Kerotest Manufacturing Co.

Booths 89, 90, 121, 122, Oklahoma Building

NEW PRODUCTS DISPLAYED:



Kerotest Keroseal Valve is designed to guide the Keroseal disc assembly into position while maintaining clearance between disc and seat rings. No lubricant is needed to effect a bubble-tight seal. The full opening Keroseal permits product flow in either direction without friction drag across the seat faces and without wiping action and consequent wear and galling of seating surface. Double block and bleed eliminates the need of line blinds. The valve is suitable for the lightest gases as well as the heaviest liquids and may be used with any standard type of operator. Keroseal may be adapted to a wide variety of applications.

Circle No. 146 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Needle Valves; Relief Valves; Diaphragm Packless Globe Valves; General Purpose Valves; Flow-Line Valves; Globe Valves; Angle Valves; Gate Valves; Steel Pipe Relief Valves; Check Valves.

Lynes, Inc.

Booth 31N, North Area

NEW PRODUCTS DISPLAYED:

Lynes Inflatable Packer can be set in open hole or in casing up to two times its uninflated run-in diameter. As tool is set by hydraulic pressure, tubing weight is not necessary to anchor or hold it in position. In more than a year of testing, packer has proved highly successful in open hole and casing packoff for water flood injection, gas-oil ratio control, water entry control, salt water disposal, production uses, and as bottom hole plug.

Circle No. 147 on Postcard, Page 287

Power-Plus Corporation

Booths 31-33, Park Lane

NEW PRODUCTS DISPLAYED:

REN Lubricating Oil Meter is pressure regulating and has positive displacement, highly accurate means of measuring very slow rates of flow for automatic engine lubrication systems.

Circle No. 148 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Oil Level Regulators, Exhaust Condensers.

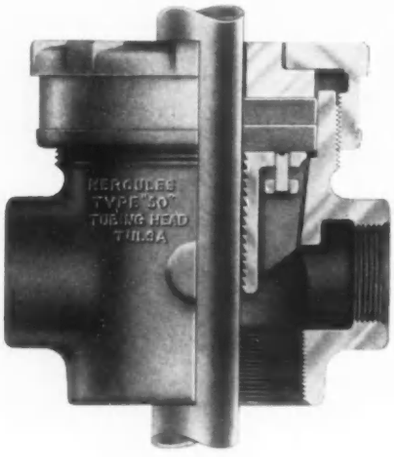
Hercules Tool Company

Booths 7, 8, 9, California Building

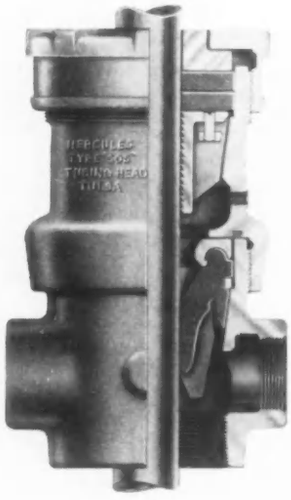
NEW PRODUCTS DISPLAYED:

Hercules Type DS Pumping Tee is used on dual string pumping wells having minimum tubing center-to-center distances of 3 35/64 inches. Tee can be screwed onto one string of tubing without contacting other string, is constructed from pressure cast steel and hydrostatically tested to 5,000 psi.

Circle No. 149 on Postcard, Page 287



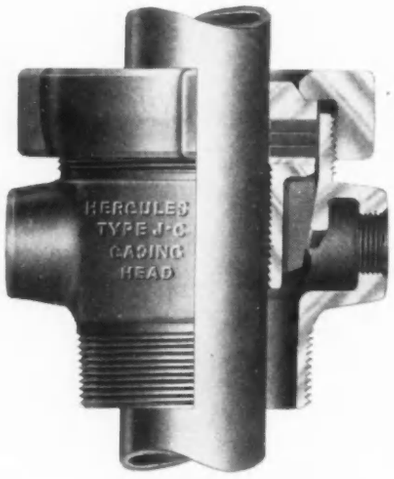
Type SO



Type SOS

Hercules Type SO and SOS Tubing Heads have operational rating of 4,000 psi test, 2,000 psi working pressure and 188,000 maximum recommended load. They are particularly suitable for pumping due to compactness (12½ inches high)—and are easily adaptable to fracturing and other well servicing operations because of strength and efficiency of parts design. Constructed from pressure cast steel and hydrostatically tested to pressures greater than rating, heads have easy to install and self aligning three-piece hinged slips. All sizes are full-opening and are equipped with two 2-inch side outlets (3 inch optional at no extra cost). Type SOS stripper tubing head has neoprene tubing stripper and bowl screwed onto cap thread. Used in well servicing operation as well as on flowing wells.

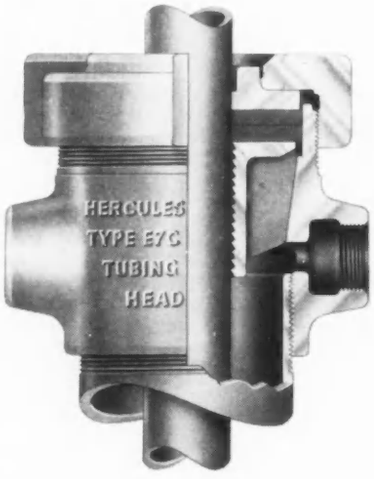
Circle No. 150 on Postcard, Page 287



Type JC

Hercules Type J-C Casing Head (with cap) has operational rating of 4,000 psi test, 2,000 psi working pressure, 200,000 pound maximum recommended load. This medium pressure casing head conforms with latest field requirements and production practice. Constructed from pressure cast steel, each body is hydrostatically tested prior to assembly of head and test pressure is stenciled into the body casing. Heads are furnished with Hercules self-aligning hinged slips and overhead packing arrangement. Cap thread is adaptable to blow-out preventers, flanges, etc.

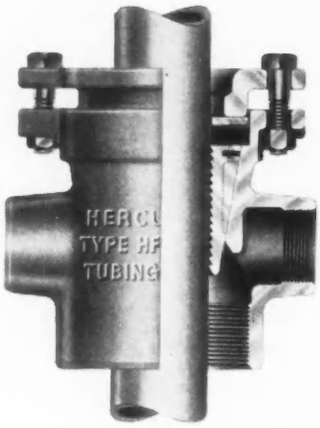
Circle No. 151 on Postcard, Page 287



Type E7-C

Hercules Type E7-C and E7C-S Tubing Heads have operational rating of 3,000 psi test, 1,500 psi working pressure and 150,000 lb. maximum recommended load. Used on wells of medium depth and pressure, they have one piece body made from pressure cast steel (no welds) and are hydrostatically tested to rated test pressure. Slips are hinged for easy installation and positive alignment. Heads equipped with Hercules overhead packing which consists of two neoprene packing rings and top metal packing ring. Can be used as economical casing head because of ability to suspend inner strings as large as 4½-inch OD and 5½-inch OD casing. All sizes are full-opening and furnished with two 2-inch side outlets.

Circle No. 152 on Postcard, Page 287



Type HF

Hercules Type HF Tubing Head has operational rating of 1,000 psi test, 500 psi working pressure, 30,000 lb. recommended load. Used on shallow and low pressure wells in areas where potential production will not justify expensive wellheads, Type HF has such features as: Pressure cast, one piece steel body with two 2-inch side outlets, full size hinged slips, overhead packed with neoprene packing ring.

Circle No. 153 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Stuffing boxes, pumping tees, tubing hangers, casing supports.

Stewart & Stevenson Dist. Co.

Booth Upper Half of Block 122

NEW PRODUCTS DISPLAYED:

Koomey Pressure Reducing and Regulating Valve is utilized on Koomey BOP Operating Units to reduce accumulated pressure over 1,500 psi on certain type preventers and also regulates pressure on the downstream side of valve from 0 psi to 1,500 psi to permit rotating or stripping operations to be performed through the blowout preventer.

Circle No. 154 on Postcard, Page 287

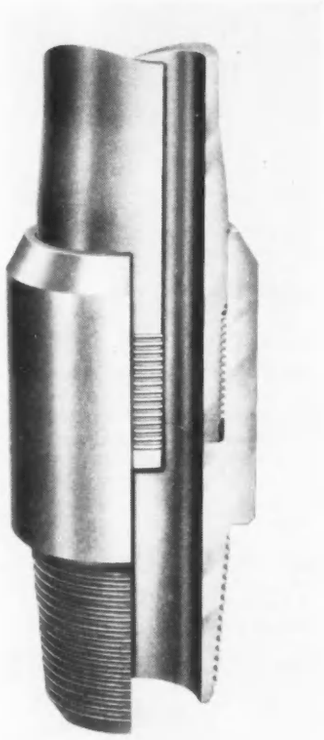
OTHER PRODUCTS DISPLAYED:

Koomey Blowout Preventer Operating and Testing Units.

Reed Roller Bit Company

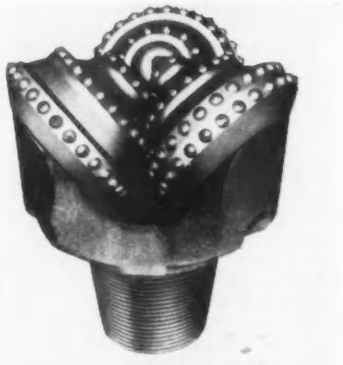
Block 4

NEW PRODUCTS DISPLAYED:



Reed Wide Open Tool Joints are designed for use on lightweight pipe. They have larger I.D. than internal flush, matching I.D. of lightweight drill pipe. W.O. working connections are interchangeable with I.F. in most sizes. Available in both Shrink Grip and Welded type.

Circle No. 155 on Postcard, Page 287



Reed YVC "Comet" Rock Bit features bit teeth and tungsten-carbide inserts in combination. By interspersing hard-formation teeth with pointed inserts, Reed combines digging capacity with maximum crushing action and resistance to gage wear and abrasion. Bit is designed to drill non-uniform formations which vary from considerable hardness and abrasiveness to extreme hardness, abrasiveness, and high compressive strength.

Circle No. 156 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Reed rock bits—2, 3, and 4 cutter; tool joints—super shrink grip, flash welded; drill collars; core drills.

Hildebrandt Engineering Co., Inc.

Booth 237, Okla. Bldg.

NEW PRODUCTS DISPLAYED:

The new heavy-duty HECO line of standard 12-inch chart pressure and temperature recording instruments features a weathertight, universal case mounting design, as well as a unique chart storage rack. By simple, inexpensive adaptors, the case can be converted from standard rigid panel mounting to vibration-proof spring suspension mounting, or to a base 2-inch pipe stand mounting, or to portable leg stand. As many as three pressure or temperature variables may be measured simultaneously.

Circle No. 157 on Postcard, Page 287

Mosely Magnetic Fishing Tool provides a self-powered "drop-type" tool suitable for removing small steel junk from the drill hole. The tool magnetizes the drill bit itself while it is on the bottom and in close contact with the destructive steel chips.

Circle No. 158 on Postcard, Page 287

HECO Mud or Cement Gage adapts the Kerr Pulsation Dampener to this service. A neoprene cup diaphragm is introduced ahead of the dampener element. A modified Ashcroft Duragage is used as the indicating gage and is set in a vibration proof spring mounting. Use of separate gage assembly allows easy pressure range changes without affecting the dampener-diaphragm section. When recorded pressures are desired, the new HECO 12-inch chart recorder is used.

Circle No. 159 on Postcard, Page 287

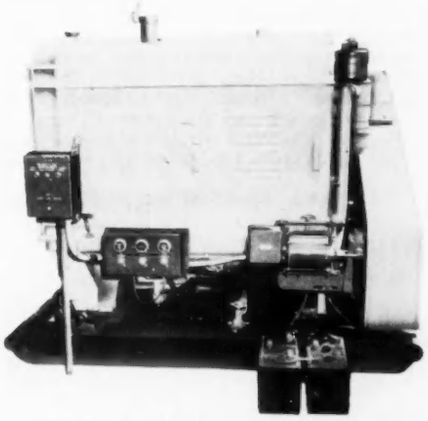
OTHER PRODUCTS DISPLAYED:

Six and ¾-inch Case Portable Midget HECO Pressure and Temperature Recorders; Kerr Pulsation Dampener.

Frank W. Murphy Mfg., Inc.

Booths 14, 15, California Building

NEW PRODUCTS DISPLAYED:



Murphy-Matic Automatic Engine Controller starts, stops on time cycle, tank level, pressure or any other predetermined condition. Gives full time protection against engine malfunction. Provides full automation to oil well pumping, salt water disposal systems, waterflood systems, pipe line gathering pumps, and gas compressor stations. Models for natural gas, LPG, gasoline, or diesel engines.

Circle No. 160 on Postcard, Page 287

Oil Level Switch-Gauge is combination oil level sight gage and low oil level safety switch. Provides inexpensive engine protection.

Circle No. 161 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Automatic Tank Level Controls Model DF-755 Series and L-500 Series Pressure Vessel Level Controls; Model of electric motor powered fully automatic waterflood.

Alten Foundry & Machine Works, Inc.

Outside Display, Block L

NEW PRODUCTS DISPLAYED:

Safety Pak Stuffing Boxes are made of Alten fully annealed Ductile Iron with a working pressure of 1,500 psi. Split top permits removal of top when adding or replacing packing. Stuffing box can be used on most dual completion wells and will accommodate all rod and liner sizes from 1⅛ inches to 1½ inches by changing only the bronze wear bushings. Packing rings are designed with V-type grooves at the top and bottom of each ring acting as an oil reservoir and pressure on bottom of ring, expands ring to form a leak-proof seal eliminating frequent tightening.

Circle No. 162 on Postcard, Page 287

Wonbolt Sr. Polished Rod Clamps are made of Alten fully annealed Ductile Iron. Design permits easy removal of clamp from rod as nut need only be loosened a few turns and clamp pulled apart. The new design in rod bore gives greater gripping power thus eliminating slippage. Clamps can be furnished to accommodate all rod sizes from 1⅛ to 1½.

Circle No. 163 on Postcard, Page 287

Wonbolt Nonslip Polished Rod Clamps have been tested with a 100,000 pound load applied to rod. Alten fully annealed Ductile Iron makes this possible. Wonbolt design permits easy assembly and removal of clamp from rod. Nut need only be hand

tightened and well load applied to complete the action. The greater the well load, the more gripping power the clamp has. Clamps will accommodate all rod sizes from 1⅛ to 1½ by changing the slips.

Circle No. 164 on Postcard, Page 287

Safety-Seal Tubing Heads can be furnished in various sizes and combinations. Four and one-half inch, 5½ inch full opening or 7 inch casing sizes with male or female threads are available. Will accommodate tubing sizes 2⅜ inches and 2⅞ inches with or without stripper rubber. Design is constructed from steel bodies, fully annealed Ductile Iron handwheel and packing ring, hardened steel slips, neoprene packing rubber and reinforced stripper rubber to resist oil and gas for long life. Packing rings, rubbers and slips are split for quick and easy installation. All threads are precision machined to API standards.

Circle No. 165 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

A-3F-D6 Pumping Unit; A-24CF-320 Pumping Unit; D-57 Gear Reducer with Transparent Top Illustrating Working Mechanism and Lubricating System; Wonbolt Jr. Polished Rod Clamps; Safety-Grab Casing Supports; Lubricated Plug Valves.

Insley Manufacturing Corporation

East End of Block 9

NEW PRODUCTS DISPLAYED:

Insley Type M Excavator-Crane with trench hoe attachment mounted on 12 ft. 6 in. crawlers with 30-in. shoes. Has ¾ cubic yard bucket capacity, 15-ton crane capacity on crawlers, 20-ton capacity with truck on MAXI self-propelled mounting. Prominent features: new die vision cab with increased safety and comfort for operator, large diameter shafting with involute splining for maximum strength, increased use of anti-friction bearings, heavy duty mechanical clutches and brakes, deep design crawler car body and heavy duty trench hoe attachment. Also, Caterpillar D315G diesel engine and Cotta two-speed transmission.

Circle No. 166 on Postcard, Page 287

Insley 45-ton truck crane rigged with 60 ft. boom and mounted on Insley Model T-84-H (8 x 4 drive) truck. Truck has Waukesha 145 GKB gasoline engine and crane upper, Waukesha 140 GK gasoline engine with torque converter. Prominent features: Fuller 4-A-86 main transmission and Brown-Lipe 8031-C auxilliary transmission, Shuler FE18G tandem front axels and Timken 4700 tandem rear axels, with Maxibrake brake attachments. Upper works features include: Combination floating and folding boom gantry, anti-friction bearing equipped hook and load rollers, high strength alloy steel shafting with involute splining, heavy duty clutches and brakes.

Circle No. 167 on Postcard, Page 287

Insley Type WT Excavator-Crane with trench hoe attachment mounted on 14 ft. crawlers with 30 in. shoes. Has 1 cu. yd. bucket capacity, 25-ton crane capacity on crawlers, 30-ton capacity with truck or MAXI self-propelled mounting. Prominent features: All steel, all weather cab with large window areas, large diameter shafting with involute splining for maximum strength, heavy-duty mechanical clutches and brakes, increased use of anti-friction bearings, and heavy duty trench hoe attachment. Also, GM 471 diesel engine and 1 cu. yd. AMSCO bucket.

Circle No. 168 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Sub-assemblies of Type M machine.

Willis Oil Tool Company

Booths 18, 19, Silver Lane

NEW PRODUCTS DISPLAYED:

Willis High-Low Shut Off Valve is adaptable to any type of service—well head, heater, tank battery, etc. It can be set to pre-determined range on either high or low. High and low are individual operations which enable operator to readily determine which one actuated valve to close position.

Circle No. 169 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Rotary Adjustable Flow Bean; Solo Choke; "EZXS" Choke; Fluid Control Valve; Rod Rotor; Tubing Rotor; Corrosion Detector; Pig Ball Injector.

Tretolite Co., Div. of Petrolite Corp.

Petrolite Building, Block U.

NEW PRODUCTS DISPLAYED:

FLUDEX Water Flood Additive is multi-purpose chemical designed to combat corrosion, scale and formation plugging in flood or disposal systems. It also is excellent wetting agent, increases volume of water injection at reduced injection pressures and eliminates possibility of harmful effects resulting from incompatability of chemicals used to treat several problems by incorporating various treating properties into one compound.

Fludex WC-4 is a water clarifier that improves water by (1) breaking oil-in-water emulsions, (2) de-oiling solid particles such as iron sulfide and (3) aiding in flocculation and settling of solids found in brines.

Circle No. 170 on Postcard, Page 287

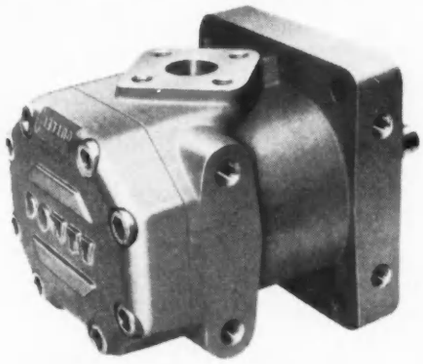
OTHER PRODUCTS DISPLAYED:

TRET-O-LITE Demulsifier, KONTOL Corrosion Inhibitor, SOLVO Paraffin Remover, S. P. Scale Preventive, KUPLEX Metal Deactivator, TOLAD Fuel Additive, Desalting Compounds, De-Oiler, Korid Metal Conditioner, Dehydro Asphalt Additive.

Berry Hydraulics

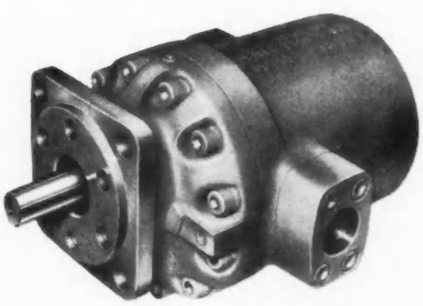
Booth 39, Oklahoma Building

NEW PRODUCTS DISPLAYED:



Dowty Hydraulic Gear Pumps range from ½ to 60 gallons per minute at pressures to 2,500 psi. Applications include supplying hydraulic fluid for raising derricks, operating blowout preventers, and powering cylinder operated tongs. Use of pressure balancing principle permits peak efficiency over wide performance range. Aluminum housings are used to reduce weight and heavy journal bearings assure long, dependable operation. Pumps will handle clean fluids within viscosity of SAE 5 to SAE 90. Units are also source of fluid power for both short and long stroke hydraulic well pumping units.

Circle No. 171 on Postcard, Page 287



Model "A" Hydraulic Pump Motor is flexible source of auxiliary power. Units are used as shale shaker drives, pumps for blowout preventers, motors for rig wash pump, wire line measuring devices and bug blower fans. As motors they may be used to develop up to 21 horsepower at 2,100 rpm and 2,000 psi. As pumps they may be used to deliver up to 12 gallons of oil per minute at 2,000 psi continuous, 3,000 psi intermittent pressure ratings. Units can handle overhung loads imposed by V-belt or chain drives. Inherent explosion-proof features of hydraulic equipment make these units ideal for hazardous locations.

Circle No. 172 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Pumps and motors from 1 to 300 gpm and hydraulic transmissions to 400 horsepower.

Gardner-Denver Company

Blocks 118, 203, 10

NEW PRODUCTS DISPLAYED:

Gardner-Denver GD-2100 Drawworks is one-piece unit designed for deepest drilling. It can be moved in one load. Chains stay in place, sealed inside dust-tight housing. The drawworks is controlled by air controls that are free from congestion. Expendable parts may be replaced without major dismantling, service points are easy to reach and standardized components are available. Unit is engineered for mobility, toughness and simple maintenance.

Circle No. 173 on Postcard, Page 287

Gardner-Denver BN Centrifugal Mud Charging Pumps, in 4 and 5-inch models, maintain continuous positive head of pressure during drilling.

Circle No. 174 on Postcard, Page 287

Gardner-Denver PO-7 and PL-7 Plunger Pumps are designed for deepest drilling. The PO-7 has six plungers, three on one side and three on the other. The 650-horsepower pump is of Scotch-Yoke design and has capacity of 5,000 pounds of pressure per square inch. The PL-7 is 300 horsepower model of similar design, also designed for deep drilling. Both pumps are light and compact, making them extremely mobile.

Circle No. 175 on Postcard, Page 287

Gardner-Denver 18B-9 Impact Wrench has 1¼-inch capacity. It utilizes same mechanism used in the 18B-7 wrench with ¾-inch capacity, and can be used in erection and disassembly or servicing of nearly all petroleum equipment.

Circle No. 176 on Postcard, Page 287

Gardner-Denver "Mole-Drils" in five sizes for 4, 5, 6 7 and 8-inch holes.

Circle No. 177 on Postcard, Page 287

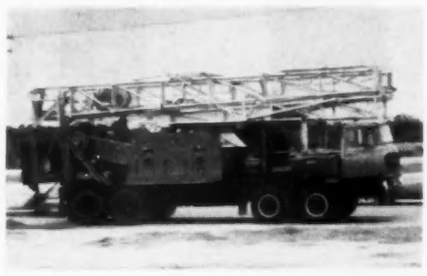
OTHER PRODUCTS DISPLAYED:

PA-8, PG-3 and PE5 Water-Flood Pumps; AG Steam Pump; WEN, ADR and ADD Compressors; T-579-LT Tank Mount Compressor; GXP and FXG Pumps; RXB Booster Compressor; Filter-Regulator Lubricator; 1-inch Hexagon Socket Ratchet Wrench; Impact Wrenches; Air Hoist; Piston Drill; Sump Pump; Sinkers; Paving Breakers; Tampers; "Twindril"; "Quadril"; 600 Rotary Portable Compressor; 125 Rotary Compressor.

Fred E. Cooper, Inc.

Blocks A, B, D

NEW PRODUCTS DISPLAYED:

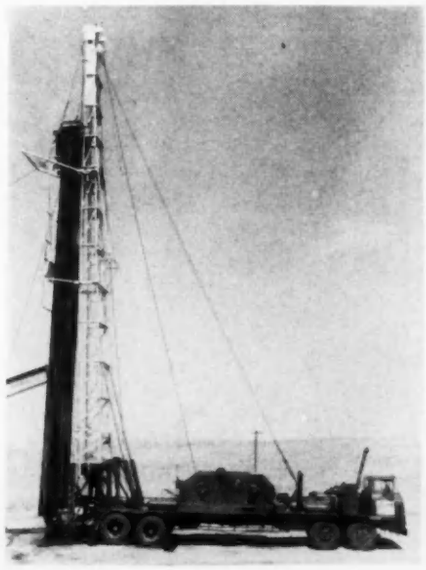


Cooper Model TC Self Propelled Oil Well Servicing Machines are built specifically for oil well servicing and workovers. They are rated to 12,000 feet, depending on engine selected and size of drum brakes. Drive to drums and road is through torque conventer synchro-mesh gear transmission which delivers engine power to load smoothly and at speed ratio chosen by machine operator. Machine is available with Cooper pipe masts or Cooper guyless derricks. Complete with pipe masts or derricks, it is engineered for proper axel load distribution and balance, meeting highway regulations, and providing maximum field portability. Offered with single or tandem front axles, depending on size of machine and field conditions. Operator's cab is located forward to provide complete visibility for driver.

Circle No. 178 on Postcard, Page 287

Cooper Model D-14 Winch Tractor is built for low cost well servicing to 3,500 feet. Its rugged construction, low weight and large tire size makes it adaptable for rough oil field terrain. It is suitable for bailing, swabbing, or rod and tubing service as its eight line speeds on drum makes right speed and pull available to efficiently handle these varied jobs. Tractor is powered by Allis-Chalmers engine. Power is delivered through heavy duty helical gear tractor transmission having four speeds, each of which is available in high or low range by friction clutch running in oil. Complete mast, cathead, line guide shell, drum dividers and power steering are optional.

Circle No. 179 on Postcard, Page 287



Cooper Model T Skytop Rigs, designed for heavy oil well servicing and workovers, are rated to handle deepest wells. They are available with gasoline, LPG, or diesel engines which drive through converter coupled with planetary transmission. Drive provides instantly the best

transmission speed, and may be varied through air control at operating position. Patent derrick is roaded with traveling block strung up. It is raised or lowered hydraulically in matter of minutes. It racks pipe being pulled in doubles, even though it is only 66-feet high. Exclusive design gives advantages of less weight, compact legal road dimensions and economical operation. Rig is quickly changed from pipe or rod service to workover operations, using same pulling line and traveling block string up. Derrick hydraulic system is used for handling pipe during racking operations, and is suitable for hydraulic tong operation without modification or special control equipment.

Circle No. 180 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Cooper Well Servicing, Workover and Drilling Equipment; Engine Power Units for general power use in the field.

Lee C. Moore Corp.

Booths 65, 66, Oklahoma Bldg.

NEW PRODUCTS DISPLAYED:

New Type Folding Servicing Mast allows the short transportation length for any given height mast. It can be mechanically raised in a single stage operation with legs in true alignment when in erect position (no leg overlap).

Circle No. 181 on Postcard, Page 287

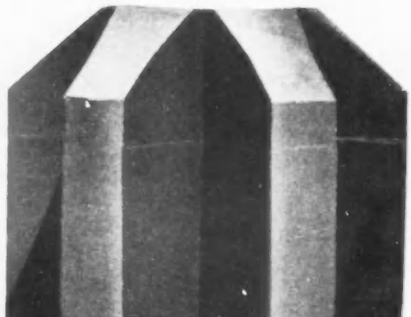
OTHER PRODUCTS DISPLAYED:

Five Miniature Models of various types and sizes of Drilling Masts and Derricks; Three full-sized Portable Drilling Masts; One full sized Derrick.

Drilco Oil Tools, Inc.

Booth 27, Texas Building

NEW PRODUCTS DISPLAYED:



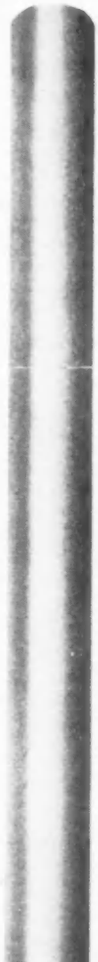
Drilco Large Diameter Rubber Stabilizers, used with 8 inch or larger drill collars, are designed to assist drilling in surface or in intermediate holes. Drilco designed and built molds for 13¾, 15, and 17½-inch hole sizes. New type sleeves provide larger circulation passages between the ribs for removal of large size cuttings. Rubber coverlets are of durable oil resistant neoprene compound developed by the improvement on smaller size tools used in deeper holes in the past. New methods of bonding the rubber to the steel insert also are used on these sleeves, as well as prow-like ends on the rubber ribs to assure channeling of cuttings into the flutes of the sleeve.

Circle No. 182 on Postcard, Page 287

Drilco Model #60 Rotary Reamer is a re-design of the old model Reed Rotary Reamer. The new design utilizes drive in the pin blocks to facilitate easier maintenance of the reamer bodies in the field. This eliminates all welding on the body necessary in the old design. The reamer cutters and pins have been changed to provide harder bearing surfaces to increase cutter life. Because of easier part maintenance, the reamer can be used in remote areas or export.

Circle No. 183 on Postcard, Page 287

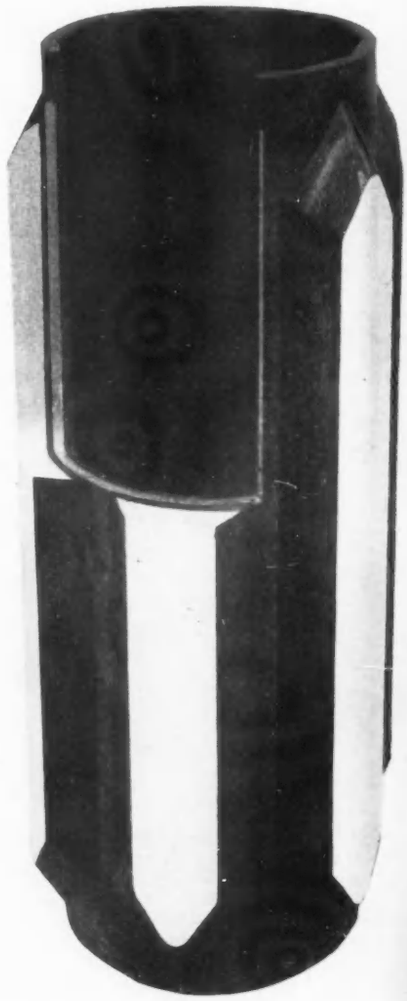
#60 Rotary Reamer



Tubeweld Drill Collar

Drilco Tubeweld Drill Collars utilize substitute steels for the center section of the drill collar and new welding techniques for welding alloy steel on the ends of collars. The center section of the collar provides only weight and stiffness. Regular API drill pipe steel is used. Welding method includes close control measures. After stress relieving each weld zone, hardness is checked to isolate any bad spots in the weld zone, assuring a second stress relief where necessary. Before welding, a close fit plug is placed in the bore between center section and stub to assure alignment.

Circle No. 184 on Postcard, Page 287



Drilco Aluminum Rib Non-rotating Stabilizer is designed for use in holes which give trouble due to caving shale. Aluminum ribs prevent stabilizers from being cut by shale. Also, wide circulation passage between the ribs allows better removal of cuttings past the stabilizer. New bonding methods enable the aluminum to be attached to the steel insert body of the stabilizer by a thin layer of rubber which gives resiliency to the ribs.

Circle No. 185 on Postcard, Page 287

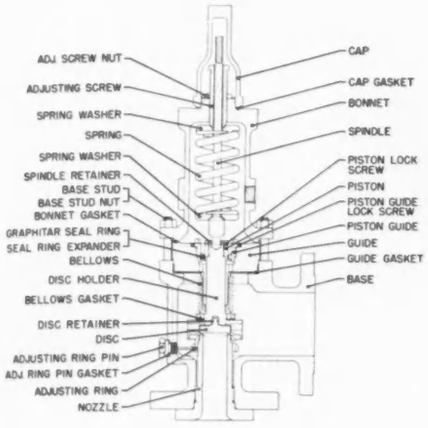
OTHER PRODUCTS DISPLAYED:

Drilco Rubber Stabilizers for Drill Collars; Drilco Alloy Drill Collars; Drilco Torquemaster (torque indicator for drill collars); Magnaglo Field Inspection Unit.

Manning, Maxwell & Moore, Inc.

Booths 229, 230, Okla. Building

NEW PRODUCTS DISPLAYED:



Consolidated Bellows Safety Relief Valve With Auxiliary Balancing Piston maintains its set point and proper blow down regardless of bellows failure. The valve is designed for corrosive services with varying back pressures. Two ply stainless steel bellows seal working parts and closed bonnet from fluid stream. If bellows fails, balancing piston counteracts back pressures so that valve continues to operate to capacity throughout its blowdown range.

Circle No. 186 on Postcard, Page 287

Ashcroft Non-Indicating Pneumatic Transmitters convert pressures or temperatures to pneumatic signals for distant control systems. Sensitivity is within 1/10 of 1 percent of span. Repeatability on Short Span Transmitters is 1/40 of 1 percent of reading. The self-compensating dual Bourdon tube design eliminates ambient temperature errors. Linearity is automatically maintained at all times, making calibration extremely simple. Standard Transmitters are available in pressure ranges to 20,000 psi and temperatures from —30 to 1,000° F. Highly suppressed Short Span Transmitters, fully adjustable across wide range limits, are available with operating spans as low as 3 psi or 30° F.

Circle No. 187 on Postcard, Page 287

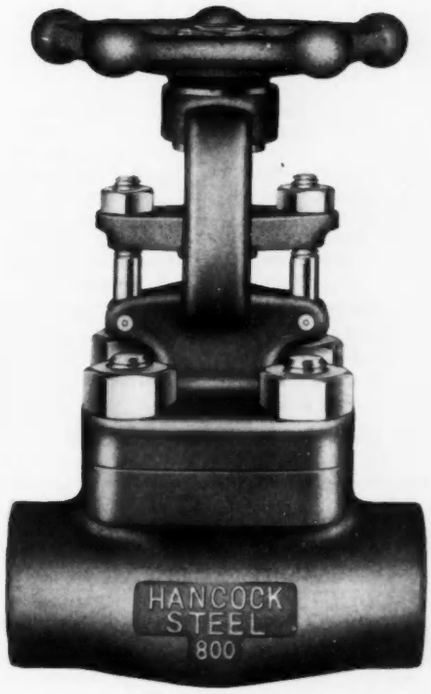
Microsen Electro-Pneumatic Relay is a simple, economical transducer, converting direct current signals to proportional pneumatic signals. It can be used, without change in parts, for either direct or reverse action and is compatible with any electronic control system. Accuracy is within ±1 percent of span and sensitivity is within 0.1 percent of input range. Two models are available, both with an explosion proof housing—V443 for small load volumes such as bellows receivers or pneumatic valve positioners, and V453 with integral booster for pneumatic systems with high load requirements.

Circle No. 188 on Postcard, Page 287

Ashcroft Indicating Pneumatic Transmitters convert process pressures or temperatures to proportional 3-15 or 3-27 psi pneumatic signals for distant receivers or control devices. The large 6-inch indicator is Ashcroft Duragauge or American Dial Thermometer. Extension rod adjustments, exposed by removing back cover, allow easy calibration. Pneumatic unit remains sealed at all times. Pressure Transmitters, accurate to within ½ percent of span, are available in vacuum and pressure ranges to 100,000 psi. Temperature Transmitters are available, with mercury or gas actuation in ranges to 1,150° F.

Circle No. 189 on Postcard, Page 287

Type 930 Gate Valve

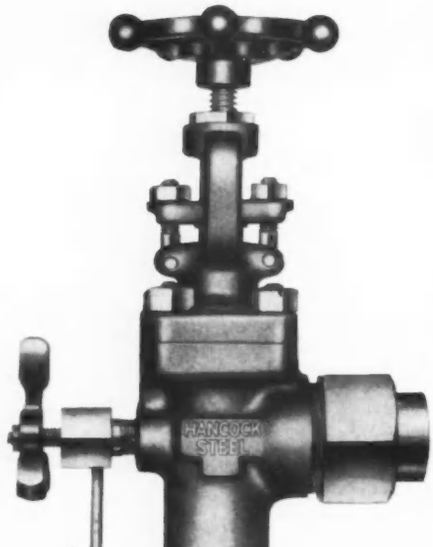


Type 970 Gate Valve

Hancock 930 and 970 Forged Carbon Steel Gate Valves provide leakage free closure on process piping systems. They are designed for 150 through 2,000 pound

pressures. Type 930 is an economical gate valve with standard flow ports and inside screw, bolted bonnet construction. It is available in ¼-inch through 2-inch sizes. Type 970 has full flow ports. Construction is bolted bonnet, outside screw and yoke. It is available in ½-inch through 2-inch sizes. Both valves have fully guided "500 Brinell" stainless steel wedges and spiral wound stainless steel Flexitallic gaskets for perfect closure under high overpressures.

Circle No. 190 on Postcard, Page 287



Hancock Forged Steel Stop and Bleed-Off Valve offers single unit economy while serving as both stop valve and bleed-off vent for sampling on gauge and instrument lines. Suitable for pressures up to 600 psi at 910° F, or 2,000 psi at 100° F. valve has bolted bonnet, outside screw and yoke construction with seats and discs of "500 Brinell" stainless steel. Spiral wound, stainless steel Flexitallic gasket guarantees perfect closure under overpressures. The inlet is ¾ inch male NPT and the outlet is either ¼ inch or ½ inch female NPT union connection.

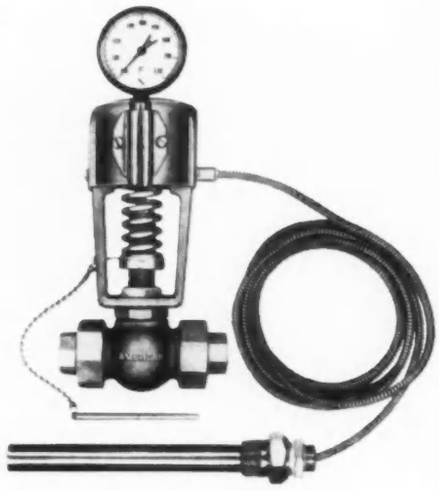
Circle No. 191 on Postcard, Page 287

Templeton Kenly & Co.

Booths 42, 43

PRODUCTS DISPLAYED:

Jenny High Pressure Portable Hydraulic Pullers, 30 to 100 tons capacity, both solid and center-hole with built-in self-contained hand pumps. Used for pulling valve seats from slush pumps. Standard Industrial Hydraulic Jacks, Models 3 to 100 tons capacity; A1022 10-Ton Light Weight Aluminum Mechanical Ratchet Lowering Jack; Rol-Toe Foot Lift Hydraulic Jacks. Models 10, 25, 50 ton capacity.



American Temperature Regulator, responding to temperature change at its bulb, automatically maintains tank temperatures through throttling action of its control valve on heating line. Packless valve construction virtually eliminates regulator maintenance. No lubrication is necessary. There is no stuffing box friction. Valve stem begins corrective action with 1/10 degree temperature change at bulb. Indicating and non-indicating models are available with armored bronze or stainless steel systems, or corrosion proof plastic insulated systems for metal finishing services.

Circle No. 192 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Industrial Dial Thermometers, Pressure Gages, "Maxitest" Gages, Recording Thermometers, Electronic Recorders, Electro-Pneumatic Relays, Electronic Transmitters, Electronic Controllers, "Flocontrol" Valves.

Jensen Engineering Company

Booths 45N, 46N, North Area

NEW PRODUCTS DISPLAYED:

Lease Tank Mixer, designed especially for lease tanks for the purpose of resuspending paraffin, is adaptable where it is not convenient to remove the tank from service for cleaning or chemical treatment. Jensen Vari-Angle feature is included on this unit and a separable drive unit is available permitting several tank units to be operated with one motor gear unit.

Circle No. 193 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Side-Entering Mixers; Portable Process Mixers.

Lone Star Steel Company

Booth 69, Texas Building

PRODUCTS DISPLAYED:

Line Pipe; Casing and Tubing for Drilling, Production, Pipe Line Construction.

Philadelphia Gear Corp.

Booth 20, Science and Technical Building

NEW PRODUCTS DISPLAYED:

Limitorque Valve Operator-Type P2 is economical and efficient means of motor operating small, normally hand operated gate or globe valve, either new or in service. Available in NEMA IV or NEMA VII Standards and 35 foot pounds maximum output torque, and up to 2,000 pounds maximum thrust. Can be furnished with three phase, 60 cycle, 220 or 440 volt motors, or single phase, 60 cycle, 110 volt motors.

Circle No. 194 on Postcard, Page 287

Limitorque Valve Operator-Linear is economical and efficient means of motor operating normally wrench operated plug valves. Available in NEMA IV or NEMA VII Standards. Operator consists of motor and double reduction gearing, all driving a traveling screw connected to crank mounted on square shank valve. Maximum output thrust is 800 pounds. By connecting screw to a crank, which in turn rotates the Plug Valve, a torque of 175 foot pounds is developed at the valve. Motors are available with three phase, 60 cycle, 220 or 440 volts; and single phase, 60 cycle, 110 volts.

Circle No. 195 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

"SMA" Series Valve Operator, "Linear" Operator for Small Plug Valves, "PB" Operator for Butterfly Valves.

Magnaflux Corporation

Booths 10, 11, Silver Lane

NEW PRODUCTS DISPLAYED:

Sonizon SO-200 portable, battery-powered ultrasonic instrument measures thickness from one side only.

Circle No. 196 on Postcard, Page 287

The Magnatest ED-500 is an eddy current instrument for sorting and detecting cracks in metals by a simple probe scanner.

Circle No. 197 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Magnetic Particle Testing Units; Fluorescent and Dye Penetrant Kits and Units.

Vickers Incorporated

Block 104

NEW PRODUCTS DISPLAYED:

Vickers Vane Type "High Performance" Hydraulic Pumps are designed for mobile equipment use. High speed (200 rpm), high pressure (2,000 psi) operation provides high hydraulic horsepower in small package size. Available in three sizes, Series 25; Series 35; Series 45—and three capacities within each series; 12, 14 and 17 gallons per minute—21, 25 and 30 gpm, and 35, 42 and 50 gpm. All pumps feature fast, replaceable cartridge construction.

Circle No. 198 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Power Steering Components, Hydraulic Valves, Pumps and Motors, Hydraulic Power Rack.

Clevite Corp., Texas Division

Booths 32N, 33N, 34N

NEW PRODUCTS DISPLAYED:

Model MFR-1 Portable FM-AM Magnetic Field Recording System is light weight for maximum portability. No single unit weighs over 50 pounds. System can be used for either FM or Direct Recording. Recorder has 28 channels and individually sprung FM or AM-FM heads. Complete bank head is mounted on precision ways and can be removed with ease. Single channels may be replaced and phased in the field. Monitoring can be accomplished by rectilinear sequential direct writing monitor, or by conventional recording oscillograph. Unit has Clevite's stainless steel belt drive, fully transistorized power supply and motor control unit. Each sub-system is housed in rugged, fiberglass, reinforced case that is waterproof when closed. It can be readily integrated into practically any existing system.

Circle No. 199 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

MRA-2 Magnetic Recorder Analyzer.

Chiksan Company

Booths 108, 109, 110, Texas Building

NEW PRODUCTS DISPLAYED:

Chiksan Longsweep Swivel Joint is 15,000 psi swivel joint for abrasive service. Features long radius elbows to provide well directed full flow of fluids with minimum of cavitation. Made of forged steel and heat treated to improve wearing qualities. Packing is wedge-shaped in section to insure satisfactory performance under positive and negative pressures. It cannot be sucked into stream regardless of velocity of flow. API line pipe thread end connections. Available in 2-inch size only.

Circle No. 200 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Tanker Loading Systems, LR (Loading Rack) Swivel Joint, DS Series Swivel Joint; Standard Series Swivel Joints.

The Weatherhead Company

Booths 8, 9, Silver Lane

PRODUCTS DISPLAYED:

Bulk Hose, Reusable Hose Ends, Permanently Attached Hose Assemblies, 45 degree Swage Machine, CS-75 Cutting & Skiving Machine; Brass & Steel Tube Fittings (flared & flareless), Stainless Steel Tube Fittings, Forged Steel Pipe Fittings.

Eastman Oil Well Survey Co.

Booths 44, 59, Scientific and Technical Bldg.

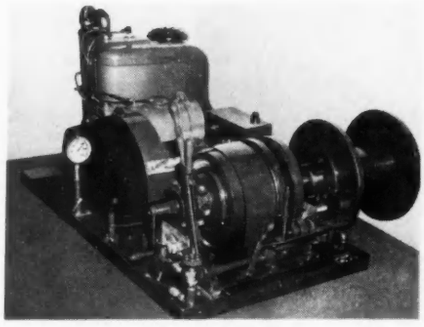
PRODUCTS DISPLAYED:

Star Recorder, Wire Line Hoist, Casing Roller, Two-Cutter Hole Opener, Snap-Lock Barrel for Drift Indicator, Drift Indicator, Drop Type Multiple Shot, Single Shot, Jar Switch, Mule Shoe Bottom Hole Orientation Assembly, Badger Jet, Button Stabilizer Drilling Assembly.

C. A. Mathey Machine Works, Inc.

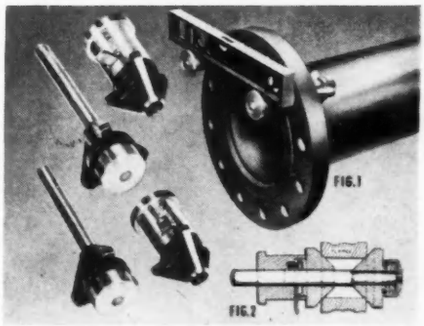
Block V

NEW PRODUCTS DISPLAYED:



Mathey Detachable Spool Reel is available with extra spools for bottom hole pressure build-ups and it takes only minutes to detach or attach spools, thus permitting single reel to be used at many well sites. Unit is available in all standard drives. Powered by gasoline, diesel, air, or electric motors. Detachable spool capacities are 12,000, 15,000 and 18,000 feet of .072 wire line.

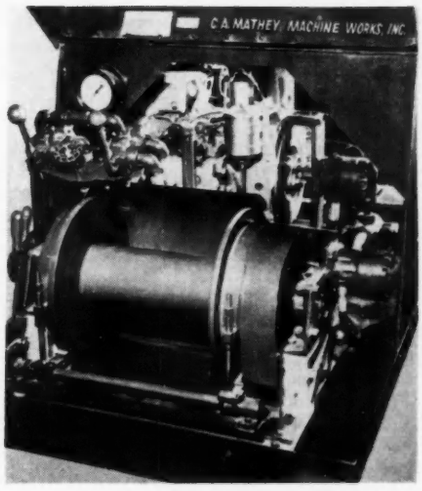
Circle No. 201 on Postcard, Page 287



Mathey Flange Line-Up Pins used for cutting and welding jigs for pipe line and fabrication, are highly useful for insuring alignment of bolt assemblies for correct and accurate joining. Line-up pins fit ¼-inch to 1¾-inch bolt holes. Pair of flange line-up pins are installed in flange holes to support spirit level so axis of holes are perfectly horizontal preparatory to welding. Cones of line-up pins automatically center pin in hole, and are designed to fit properly even on raised face flanges.

Circle No. 202 on Postcard, Page 287

Mathey "Offshore Special" Reel is designed for offshore and deep-hole work. It is skid mounted, lightweight, with special corrosion protection cover. Reel has spool capacity of 21,000 feet of .082 wire line, and brake on both ends of drum for more effective and cooler braking. Power source optional. Usually power supplied by one hydraulic motor is sufficient, but for heavy pulls a second motor may be activated also. The 4-way valves provide drive either way and assure jarring action when required. Safety valve is provided to prevent wire breakage, and throttle valve to govern reel speeds. Skid mounting and



lifting eyes optional. Reels can be furnished with any power unit desired, also with direct drives and through transmission.

Circle No. 203 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Measuring Line Reels; Measure Meters; Wire Measuring Lines; All Metal Trailers; Hay Pulleys; Mobile Well Testing and Measuring Units; Mobile Standard Compression Gas Testing Equipment; Pipe Beveling Machines; Out-Of-Round Attachments; Shape Cutting Attachments; Coupon Cutters; Automatic Pipe Tongs.

Calgon Company Division, Hogan Chemicals & Controls, Inc.

Booth 83, S. and T. Bldg.

NEW PRODUCTS DISPLAYED:

15-J Controlled Solubility Phosphate prevents scale in producing wells, gathering lines and surface treating equipment. It is safe, self feeding and 100 percent active sodium calcium phosphate.

Circle No. 204 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

1-R, Controlled Solubility Phosphate.

Allis-Chalmers Mfg. Company

Block M

NEW PRODUCTS DISPLAYED:

16000 and 21000-240 horsepower and 340 horsepower diesel engines. 21000-175 KW diesel engine generator set; G-149 and G-226 gas power units, sizes 40 to 60 horsepower.

Circle No. 205 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Electric Motor; Crawler Tractor; Motor Grader; Fork Lift Truck; Electrical Control; Texrope Drive and Process Pumps; Diesel and Gas Engines.

SKF Industries, Inc.
Booths 67, 68, Texas Bldg.

PRODUCTS DISPLAYED:
Type C Spherical Roller Bearings; Spherical Roller Thrust Bearings; Cylindrical Roller Bearings; Tyson Tapered Roller Bearings; Tyseal Bearings; Pillow Blocks; Miniature Bearings for Instrumentation.

International Harvester Company
Blocks 101, 104

PRODUCTS DISPLAYED:
International TD-15 Dozer Tractor; TD-15 Welder Tractor with twin welders; Superior TD-20 Sideboom Tractor; Drott TD-20 4-in-1 Skid Shovel; UDT-817 Turbocharged Power Unit, 385 hp; UC-135, UC-221 and UD-282 Power Units; Hough Rubber-Tired Sideboom; International Crawlers and Engines; International 560 Tractor; 460 Tractor, with No. 260 Wagner Loader and No. 95 Backhoe; 340 Tractor, with ARP Trencher and Backfill Blade; Farmall 340 Tractor, with Danco Mower; 240 Tractor, with No. 120 Wagner Loader.

The Vapor Recovery Systems Co.
Booths 69, 70, 71, Oklahoma Bldg.

PRODUCTS DISPLAYED:
Automatic Tank Gage; Automatic Tank Gage Magnetic Drive Assembly; Hi-Lo Level Pneumatic Switch; Gage Hatch; Programmer; Gage Pipe, Elbow Drive; Water Draw-Off Valve; Float; Flame Arrestor Bank; Pulse Code Central Control Unit; Pulse Code Console Receiver; Vapor Recovery Regulator; Gaging and Sampling Unit; Pressure-Vacuum Relief Manhole; Manhole Cover; Vent Valve and Flame Arrester Unit; Flame Check; Pressure-Vacuum Relief Valve (spring loaded); Vacuum Valve; Pressure-Vacuum Relief Valve with Gage and Thief Hole Cover; Internal Safety Valve; Gaging and Sampling Temperature Bomb; Sampling Gage; Vent Gage and Gage Hatch Combination Dial Reading Tank Gage.

Metal Products Division Koppers Company, Inc.
Booths 73, 74, 75, Texas Bldg.

PRODUCTS DISPLAYED:
Piston Rings; Couplings; Fans.

Waukesha Motor Company
Block J

PRODUCTS DISPLAYED:
Gas and Diesel Engines; Enginator (engine driven generator); CFR unit.

Oil States Rubber Co.
Booth 224, Oklahoma Bldg.

PRODUCTS DISPLAYED:
Tubing and Casing Swabs; Sucker Rod and Tubing Guides; Pipe Wipers; Oil Saver Rubbers.

Worthington Corp.
Booths 43N, 44N, North Area

PRODUCTS DISPLAYED:
KCAQ Horizontal Quintuplex Power Pump; KCA Horizontal Triplex Power Pump; VTE Vertical Triplex Power Pump; Sheaves; Positive Drive Belts; Clutches.

Arcair Company
Booths 28, 29, Kansas Bldg.

NEW PRODUCTS DISPLAYED:

Arcair Model H-2 Torch is designed for intermittent applications and for light uses of Arcair process. Manually operated, H-2 has positive air control valve in torch handle. By holding air orifice in head, within 4 inches of work, metal removal torch can be operated on as low as 40 psi of compressed air.

Circle No. 206 on Postcard, Page 287

Arcair Model H-3 Torch is general purpose tool designed to use up to 3/8-inch diameter electrodes. Compressed air is directed at work through two orifices in adjustable head. Air supply is controlled with push button on-off valve in torch handle, which remains in either position once it is depressed. Molded plastic, high impact insulators guard head and jaws. Air valve is completely insulated, a glass laminate sleeve protects handle from heat, and upper arm actuater is of non-conductive durable plastic. Welding machine connection lead is covered by a special rubber boot which permits quick change connection of power to torch.

Circle No. 207 on Postcard, Page 287

Cooper-Bessemer Corporation
Block G

PRODUCTS DISPLAYED:
Small Compact Compressor packages used in producing fields for gas gathering methods; Centrifugal Compressors; En-Tronic Controls; Power Engines; V-angle Gas Engine Compressors.

Enardo Mfg. Co.
Booths 257, 258, Okla. Bldg.

PRODUCTS DISPLAYED:
Time Cycle Switches and Program Clocks; Air-Loc Switchers; Liquid Level Controllers; Meter Controls; Motor Valves; Pilot Valves; Slip-on and Shur-loc Fittings; Thief Hatch Valves; In-line and Stack Vent Valves.

Technical Oil Tool Corporation
Booths 192, 193, Oklahoma Bldg.

PRODUCTS DISPLAYED:
Totco Drilling Recorder; Totco Drift Recorder; Totco Directional Recorder.

Appleton Electric Co.
Booth 35, Park Lane

PRODUCTS DISPLAYED:
Explosion-proof electrical junctions, couplings, plugs and receptacles, switches, panel boards, circuit breakers, pilot lights, lighting fixtures; Mercury-Vapor explosion-proof lighting fixtures, electrical fittings.

W-K-M Division ACF Industries, Inc.
Block 103

PRODUCTS DISPLAYED:
Gate Valves; W-K-M ASA Through Conduit Gate Valves; ACF Lubricated Plug Valves; ACF Non-lubricated Ball Valves; Key Pipe Joint Sealing Compound.

Ajax Iron Works
Blocks 1, 9

PRODUCTS DISPLAYED:
DPC-120 two stage compressor unit; DP-160 9½ by 12 inch and DP-115 13¼ by 16 inch engine.

Oil Metering and Processing Equipment Corp.
Block 120

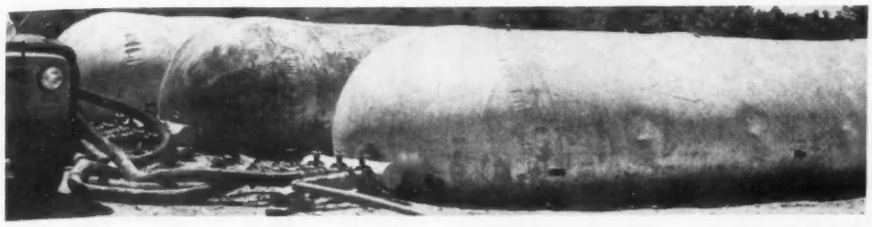
PRODUCTS DISPLAYED:
Metering Treater; Shrinkage Tester; Type CVHX Vol-U-Meter for metering oil; Type FV Vol-U-Meter for metering oil; Type CV Vol-U-Meter for metering oil; Type CP Metering Separator for separating and metering oil; Type WKCP Metering Separator; Type WKMCPX Metering Separator; Type C Metering Separator; Type F Metering Free Water Knockout; Type CT Metering Free Water Knockout; Skid Mounted Well Tester; Trailer Mounted Well Tester.

Franklin Supply Company
Block X

PRODUCTS DISPLAYED:
Motors, Rotary Pumps, Pipe Fittings, Pipe.

Firestone Tire & Rubber Co. Block 117, West Area

NEW PRODUCTS DISPLAYED:



Fabritank Rubber Coated Collapsible Storage Containers, ranging in capacity from 100 to 17,000 gallons, are made of rubberized nylon fabric and may be rolled up and easily transported from one drilling site to another. They are used for storage of diesel fuel, drilling mud, rig water, drinking water, fracturing fluids. Light weight and portable, several 400-barrel containers can be rolled up and transported cross-country on small trucks.

Circle No. 208 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Giant Sand Tires.

Standard Safety Equipment Company

Booth 2N, North Area

PRODUCTS DISPLAYED:

Face Shields; Welders' Tarps; Fire Blankets; Goggles; Acid and Chemical Resistant Clothing; Salt Tablets; Salt Tablet Dispensers; Sweatbands; Steel Toe Clips.

Drilling Equipment Mfg. Co.

Booths 26, 27, California Building

PRODUCTS DISPLAYED:

Desanders; Wash Pipe; Float Valves; Mud Valves; Nipples; Tong Dies; Spinning Chains; Junk Rings and Bushings; Hose Hobbles; Standpipe Clamps; Mud Hoppers.

Murphy Diesel Company

West of Block Q

PRODUCTS DISPLAYED:

Diesel Engines; Power Units and Generator Sets; Dual-Fuel Engines; Marine Engines; Injectors; Oil Pumps; Governors; Water Pumps; Piston and Connecting Rods.

Dia-Log Division, Ford Alexander Corp.

Booths 26, 27, 28, S & T Bldg.

PRODUCTS DISPLAYED:

Free Point Indicators; String Shots; Jet Cutters; Multiple Gage Calipers; Profile Corrosion Calipers; Injector Lubricators; Hydraulic Clean-out Tools.

Gray Tool Company

Booth 15, Texas Building

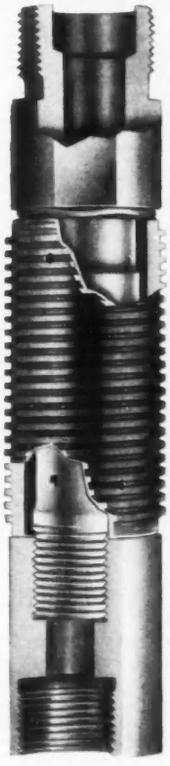
PRODUCTS DISPLAYED:

Christmas Trees, Grayloc Pipe Connections, Monel-Lined Pipe.

R. C. Williams Company

Booths 125, 126, Kansas Building

NEW PRODUCTS DISPLAYED:



Williams Sand Diverters are extensions to plungers in subsurface pumps which will catch, trap and divert sand particles from pump seal to inner bore of pump. They are especially adaptable after Sand-Frac or where time pumping is troublesome factor. Sand Diverters are made of special hardened alloy or stainless steels and have series of spiral grooves. Each groove is diverting channel so when first groove eventually wears, the next groove will continue diverting action, etc. Spiral grooves are in sleeve which is self aligning and replaceable.

Circle No. 209 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Williams Lower Valve Pullers.

Rector Well Equipment Company, Inc.

Booths 19, 21, Oklahoma Building

PRODUCTS DISPLAYED:

Casing Heads; Tubing Heads; Single and Multiple Completion Christmas Trees; Dual Unit Block Tree; PSI Plug with Running and Pulling Tools and Hanger Nipple for high and Low Pressure Oil and Gas Wells; 10,000 PSI W. P. Casing Head; 15,000 PSI W. P. Tubing Head and Christmas Tree; Type "A" and "O" Cementing Shoes and Collars; Stage Tool Cementer; Rector Seal Nos. 1, 2, 5, 7, 15.

Garrett Oil Tools Division U.S. Industries, Inc.

Block 104, Skelly Drive

PRODUCTS DISPLAYED:

Gas Lift Equipment; Safety and Relief Valves; Lease Automation Equipment; Motor Valves; Deviation Recording Instruments; Casing Milling Tools; Automatic Free Pistons.

General Controls Company

Booths 12, 13, California Bldg.

PRODUCTS DISPLAYED:

Hydramotor Valves, including 3-way, 3-position Hydramotor; Solenoid Valves; Hammel-Dahl Valves; Temperature Pressure Indicators; Time Switches; Tork-Master Electric Valve Operators; Oil Field Automatic Control Equipment for sequencing well test, strip chart data accumulation, electrical data accumulation and data receiving control, including automatic standby alarm signalling protection; Foster Flow Tube; Regulating Valves; Check Valves; Constant Pressure Valves; Water Level Float Valves; Pressure Relief Valves; Temperature Control Valves; Water Pressure Actuated Valves.

Joy Manufacturing Co.

Blocks 7, 104

PRODUCTS DISPLAYED:

Truck Mounted Portable Rig; Air Drilling Compressor; Air Hoists; Ventilating Fans; Portable Air Compressors; Rock Drills; Packaged Gas Compressor.

John A. Green Company

Booths 167, 168, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Electric and Electronic Equipment for Exploration and Research.

Salt Water Controls, Inc.

Block 207

PRODUCTS DISPLAYED:

Swaco Total Mud D-Gasser; Dorrco D-Sander with 6 inch DorrClones; Dorrco D-Sander with 12 inch DorrClones; Clayjector for reclaiming barites and rejecting clays from weighted muds, DorrClone Desanding System for water wells and pipelines.

The Geolograph Company

Booth 49, S. and T. Building

PRODUCTS DISPLAYED:

Geolograph Recorders-Mechanical Well Logging Equipment; Geodril Automatic Drillers-Automatic Drilling Control Equipment; Multicheck Recorders-Drift Indicator Recording Equipment.

National Diamond Laboratory

Booth 79

PRODUCTS DISPLAYED:

Diamond Dressers for Large and Small Grinding Machines; Diamond Lapping Compound; Diamond Boring Bars for Carbide; Diamond Hones; Diamond Quills for Precision Jig Grinding; Large Diamond Wheels in Resin Bond or Metal Bond; Diamond Dressers Sintered in Carbide; Diamond Turning Tools.

Rochester Ropes, Inc.

Booths 94, 95, Texas Building

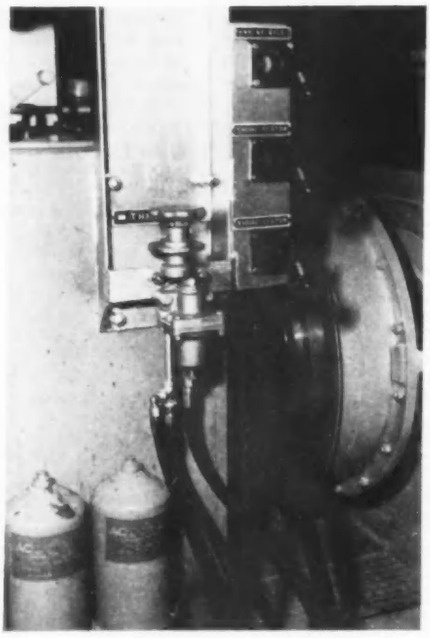
PRODUCTS DISPLAYED:

Steel Wire Rope, Plastic Covered Steel Wire Rope, Steel Wire Rope Slings, Steel Wire Rope Fittings.

Stratoflex, Inc.

Booths 97, 98, Texas Bldg.

NEW PRODUCTS DISPLAYED:



Stratoflex Flexible Hose Assemblies and Detachable, Reusable Fittings are designed for oil field applications requiring resistance to fire, high and low temperatures, excessive vibrations, high pressures and tough general wear. Assemblies are extremely flexible and suitable for use with oil, fuel, water, air, gases, and many chemical applications.

Circle No. 210 on Postcard, Page 287

Emerol Manufacturing Co.

Booths 60, 61, 62, Oklahoma Bldg.

NEW PRODUCTS DISPLAYED:

Marvel Inverse Top Cylinder Oiling System is designed to improve engine upper cylinder operation and to reduce maintenance costs. Easily installed on any engine operating well drilling equipment, power generators, trucks, autos and marine engines, Inverse Oiler provides correct lubrication for high heat upper cylinder engine areas which normally receive scant lubrication. Linked to engine's intake manifold, system provides quieter, smoother engine performance and response.

Circle No. 211 on Postcard, Page 287

Cosasco Division Perfect Circle Corp.

Booths 26, 27, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Cosasco Access Fittings; Valve Removal Nipple; High-Pressure Retriever; Wet Plug; Unitized Wellhead; Positive Choke Flow Control; Tubing Suspension Mandrel; Annulus Survey Bonnet; Corrosion Survey Instruments, including Corrosion Coupons, Thermocouples, Samplers, Probes.

American Roller Bearing Co.

Booth 20, 21, Silver Lane

PRODUCTS DISPLAYED:

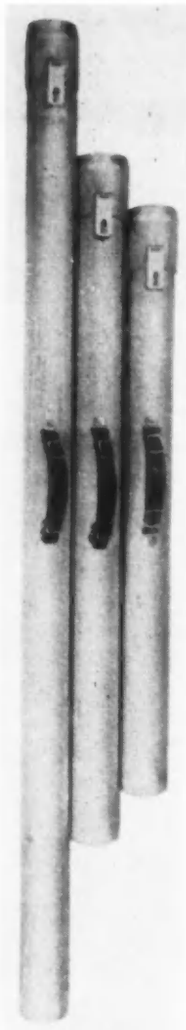
Roller Bearings.

Scott-Rice Company

Booths 7, 8, Oklahoma Building

NEW PRODUCTS DISPLAYED:

Saf-Tee Lightweight Carrying Case for maps, prints, and other large subjects that are rolled for filing and storing. Made of 15 gage 6061-T6 aluminum alloy, cases are fitted with leather grip handle. Steel hasp for padlock provides security as well as tamperproof seal when cases are used as mailing tubes. Available in three stock sizes, largest of which will accommodate rolled subjects to 60 inches. On special order, can be furnished to custom lengths.



Circle No. 212 on Postcard, Page 287

Purolator Products Inc.

Booths 17, 18

PRODUCTS DISPLAYED:

Heavy Duty Air Filters; Filter Refills, Oil, Air and Fuel for Oilfield Engines.

Double Seal Ring Company

Booth 52, California Bldg.

PRODUCTS DISPLAYED:

Double Seal Industrial Piston Rings for gas and diesel engines, compressors; Pumps; special applications.

The Edwin H. Fitler Co.

Booth 4, Texas Drive

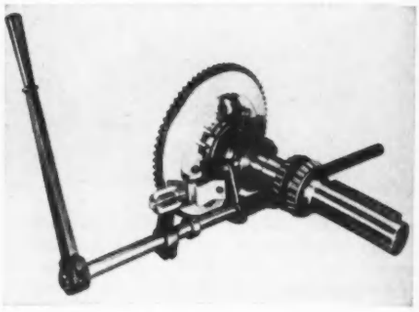
PRODUCTS DISPLAYED:

Manila Rope; Cathead Lines; Spinning Lines; Derrick Lines; Large size Manila Marine Rope for Offshore Drilling; Polyethylene Rope, "Stabilized" Nylon Rope; Synthetic Cordage.

Twin Disc Clutch Co.

Block 207, North Area

NEW PRODUCTS DISPLAYED:



Twin Disc Power Take-Offs with new clutch engagement mechanism that virtually eliminates throw-out collar wear, ending daily PTO greasing. Two sealed cam followers ride in an annular groove machined into the sliding clutch sleeve. When hand lever is pushed forward, cam followers exert forward thrust on sliding sleeve. As clutch linkage passes through tip dead center, sliding sleeve snaps forward slightly while cam followers' movement is checked by contoured detent. This positive clearance prevents wear on throw-out mechanism in the fully disengaged position. Cam followers rotate only when clutch is being engaged or disengaged. Greasing is required only twice a year. Available on Twin Disc 10, 11, 14, and 18 inch Power Take-Offs. Kits available for converting PTO's already in service.

Circle No. 213 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Clutches, Couplings, Torque Converter, Compressors.

Model CL and Model EH Mechanical Friction Clutches; Models MTS, MTU and DOC Oil-Actuated Friction Clutches; Model PO Air-Actuated Friction Clutches; Model HSD HYDRO-SHEAVE Fluid Coupling; Model HUD Disconnecting Fluid Coupling; "Limited Attendance" PTO for high-speed, high-horsepower service; Output Rubber Block Drive for compressors; 1500 Series Single-Stage Torque Converter; 1300 Series "Stripped" Single-Stage Torque Converter for OEM drive line design; Torque Converter of three-stage design for pumping and hoisting engines.

Darling Valve & Manufacturing Co.

Booths 113, 114, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Valves.

H & M Pipe Beveling Machine Co.

Booths 50, 51, California Bldg.

PRODUCTS DISPLAYED:

Portable Pipe Bevel Cleaning and Grinding Machine.

Yale Machine Works, Inc.

Booth 95N, North Area

PRODUCTS DISPLAYED:

O-Ring Unions, Unions, Insulated Unions, Ground Joints, Pipe Line Blanking Unions.

So accurate it's the world's first choice!

No matter where in the world you go, Kilgore or Kuwait, you'll find oilmen swearing by the accuracy of the TOTCO double recorder. Not satisfied with one reading, the reliable TOTCO double recorder checks itself—with only *seconds* elapsing between first reading and check. That's why most oilmen the world over say, "Be sure you know, use TOTCO!"

TOTCO

Technical Oil Tool Corporation

1057 North La Brea Avenue • Los Angeles 38, California

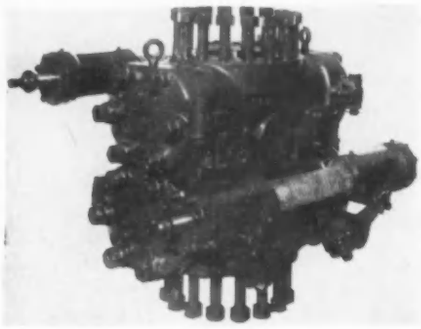
EXCLUSIVE DISTRIBUTORS: *California*—The Republic Supply Co. of California; *Domestic*—The Continental-Emsco Company, a division of Youngstown Sheet & Tube Company; *Canada*—Oil Well Supply Division, United States Steel Corporation; *Export*—Lucey Export Corp., New York City

For more data on advertised products, use Readers' Service Cards, last page.

Cameron Iron Works, Inc.

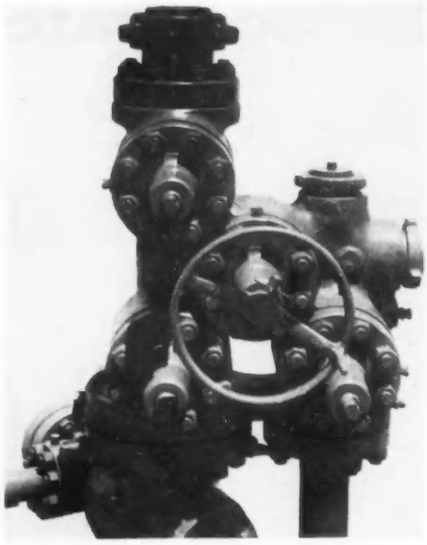
Block 115, West Area

NEW PRODUCTS DISPLAYED:



Cameron Type "F" Blowout Preventer operating mechanism is always balanced to pressure, thus closing and opening pressure is very low. Rams are self-sealing and, with hinged bonnets on preventer, are easy to change. Preventers are available in full range of sizes and working pressures to 15,000 psi. Cameron Pressure Operated Gate Valves employ new rotating seat principle.

Circle No. 214 on Postcard, Page 287

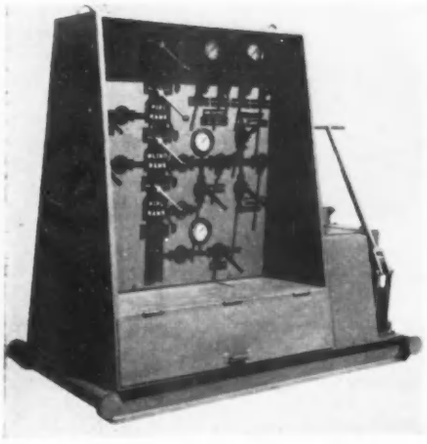


Cameron Solid Block Christmas Trees afford compact arrangement of master and wing valves. Tree height is reduced, and a number of connections are eliminated for safety and economy.

Circle No. 216 on Postcard, Page 287

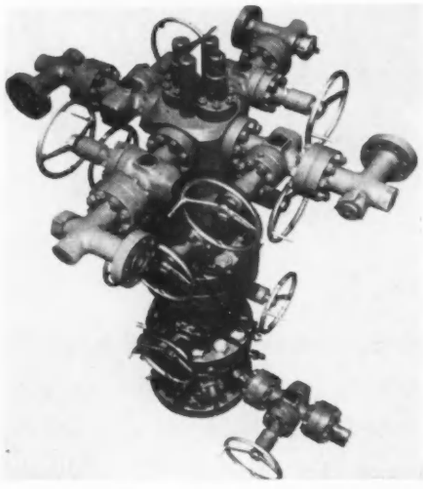
Cameron "CA" Casing Hanger is time-tested slip and seal assembly which sets automatically for any pressure or weight requirement in drilling.

Circle No. 218 on Postcard, Page 287



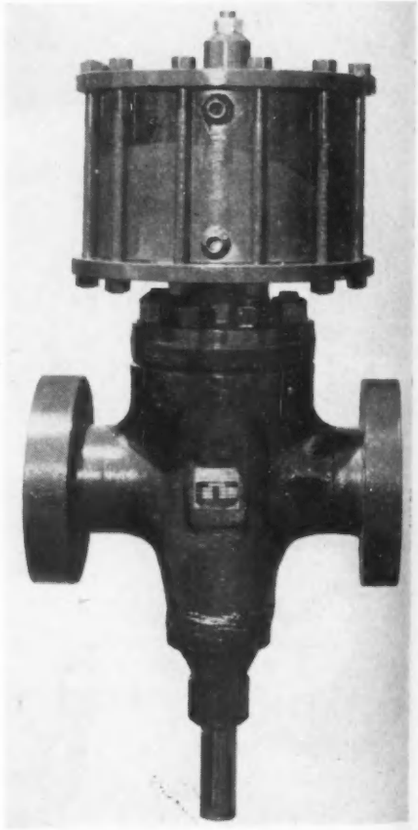
Cameron Control Panel centralizes all blowout preventer hookup controls at one station. Its graphic designation of controls eliminates hazard of operating wrong control.

Circle No. 215 on Postcard, Page 287



Cameron Multiple Completion Tree, including quadruple completion for offshore work.

Circle No. 217 on Postcard, Page 287



Cameron "HJ" Flow Controllers feature pressure balanced valves with Stellite alloy seats in compact arrangement which includes needle valve, choke, shutoff valve.

Circle No. 219 on Postcard, Page 287

Cameron Honest John Choke Beans feature flared orifice which greatly extends bean life, even under most abrasive conditions.

Circle No. 220 on Postcard, Page 287

Denison Engineering Division American Brake Shoe Co.

Booths 23, 24, Kansas Bldg.

PRODUCTS DISPLAYED:

1-ton Multipress; T1D Pump; TG Pump; D1D 4-Way Valve; V1AA Flow Control Valve; Electric Relief Valve; 4-Way Valves; TM Series Vane Pump Motors; 400, 500, 600, 700, 800, Series Pumps and Motors; 60 Series, 250 hp Pump; Flow Controls; Pressure Controls; Hydraulic Power Units; Power Transmissions for centrifuges, winches, mixers, jacking systems.

Hutchison Mfg. Co.

Booths 147, 148, 183, 184, Oklahoma Bldg.

PRODUCTS DISPLAYED:

"Rumba" Shale Shaker; "Flolight" Derrick Lighting Systems.

United Supply & Manufacturing Co.

Booths 28, 29, California Bldg.

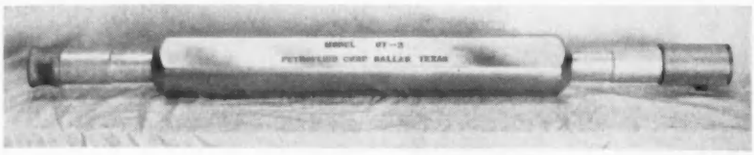
PRODUCTS DISPLAYED:

Pumping Units; Engine Starter; Transfer Units, Other Production Equipment.

Petro-Fluid Corporation

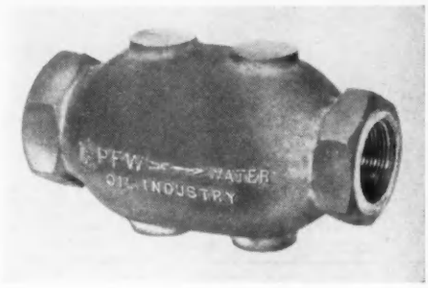
Booths 91N, 92N, Section 208

NEW PRODUCTS DISPLAYED:



Model OT Fluid Processor, Bottom-Hole High-Pressure Tubing Type developed for high-pressure oil wells such as Gulf Coast deep wells and permanent type completions. Made of special process, high-quality bronze, this processor promotes liquid flow in tubing and pipe lines; is adaptable for various surface, bottom-hole or midstring installations and is specifically useful for the economic prevention of gels in paraffin, emulsions, scale and corrosion.

Circle No. 221 on Postcard, Page 287



Model PFW Fluid Processor, Bronze Threaded, For Water Use Only, developed for use in piping systems with severe water problems. Made of special process, high-quality bronze, this processor promotes water flow in coolant systems and injection wells; is designed to fit into all water pipe lines and is particularly useful for the prevention of scale and corrosion.

Circle No. 222 on Postcard, Page 287

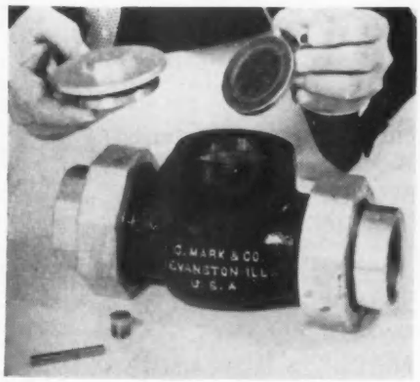
OTHER PRODUCTS DISPLAYED:

Model TZ Fluid Processor, Tubing Insert Type (for pumping wells or gas anchor applications); Model FR Fluid Processor, Flow Line Type (for flow lines and pipe lines only); Model TU Fluid Processor, Tubing In-Line Type (for bottom tubing or flow lines).

Clayton Mark & Co.

Booths 51, 52, Oklahoma Building

NEW PRODUCTS DISPLAYED:



Clayton Mark Top Entry Double Union Swing Check Valve features precision manufactured bronze clapper, engineered to provide quiet operation and effective closure when flow pressure drops. Full opening passage is provided for line cleaning and removal of parts. It can be insulated against electrolytic action.

Circle No. 223 on Postcard, Page 287

Clayton Mark Beveled Orifice Union, designed to join sections of pipe and at same time measure or control flow of liquids and gases under pressure. Union is equipped with one-piece, stainless steel disc shaped to fit contour of seats, thus eliminating need for gaskets. It is easy to install on both horizontal and vertical lines.

Circle No. 224 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Forged Steel High Pressure Pipe Unions and Fittings.

Dow Corning Corporation

Booth 33, Kansas Bldg.

PRODUCTS DISPLAYED:

Silicone Electrical Insulation, Silicone Paints, Silicone Defoamers, Silicone Fluids, Insulation, Paint Chemicals, Defoaming.

Clark Equipment Co. Construction Machine Div.

Block 119, West Area

PRODUCTS DISPLAYED:

175A Pipe Handler, 75A Personnel Carrier.

Chromium Plating Co.

Booth 25, Kansas Bldg.

PRODUCTS DISPLAYED:

Plating.

Clark Bros. Co.

Block 11

PRODUCTS DISPLAYED:

Compressors.

Bettis Corporation

Booths 60, 61, S. & T. Bldg.

PRODUCTS DISPLAYED:

Valve Actuators; Automatic Plug Valve Lubricators; Chemical Injector Pumps; Spinning Chain; Chain Tongs; Valve Operators; Injectors-Chemical; Chains; Tongs; Pipe; Lubricators.

U. S. Electrical Motors, Inc.

Booths 67N, 68N, 69N, North Area

PRODUCTS DISPLAYED:

Uniclosed Motors; Totally-Enclosed Motors; Syncrogear Motors; Holloshaft Pump Motor; Unibase Totally-Enclosed Motor; Varidrive; Submersible Pump Motor; Uniseal Encapsulated Windings.

St. Louis Cardage Mills

Booth 89, Texas Bldg.

PRODUCTS DISPLAYED:

Manila Rope.

Allied Bearings Supply Co.

Booths 1, 2, S. & T. Bldg.

PRODUCTS DISPLAYED:

Bearings.

Perfex Corp.

Booths 42, 43, Silver Lane

PRODUCTS DISPLAYED:

Radiators, Oil Coolers, Jacket Water Coolers.

Bantam Bearings Division The Torrington Company

Booths 177, 178, Oklahoma Building

PRODUCTS DISPLAYED:

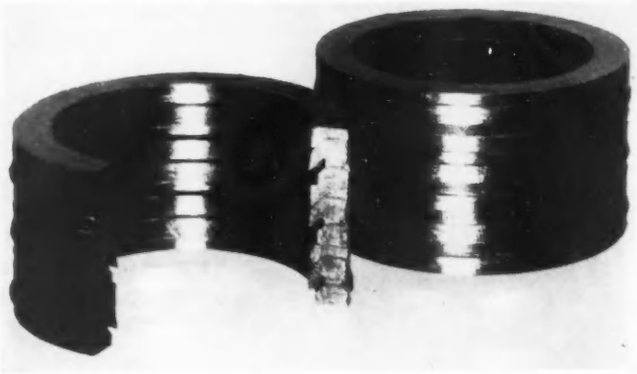
Anti-Friction Bearings for slush pumps, fracturing pumps, drawworks, rotary tables, crown and traveling blocks, pumping units, masts, compounds, shale shaker screens. Self-Aligning Ball Bushings for controls and linkages. Retainer Equipped Needle Roller Bearings for pumping units, Sheaves, Controls, Masts.

Universal Packing & Gasket Co.

Booth 16, California Building

NEW PRODUCTS DISPLAYED:

Universal Non-Adjustable Plunger Packing Style No. 835 has adapters and center section of sealing rings molded of hard composition with tough flexible sealing lip in contact with plunger. Recommended for plunger pumps handling salt water, fresh water, propane, butane, gasoline, oil and mud chemicals, etc., it is non-adjustable, non-crushable, cannot be overtightened. No metal parts required. Will not washboard stuffing box, eliminating breathing of packing gland; longer packing and plunger life due to minimum contact area on plunger; each pressure ring backed up by plunger supporting bearing ring (top adapter).



Circle No. 225 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Fluid Piston Rod Packing for Slush Pumps; Valve Cover & Cylinder Head Gaskets for Slush Pumps; Outside Liner Packing for Slush Pumps; Washpipe for Swivel Packing; Non-Adjustable Plunger Pump Packing; Molded Vee Type Packing; Metallic Gaskets; Molded Balls for valves and other sub-surface equipment; Molded Diaphragms; other molded specialties.

Schlumberger Well Surveying Corp.

Block 105

PRODUCTS DISPLAYED:

Electrical Logging Equipment; Induction Logging; Laterolog; Microlog; Microlaterolog; Radioactivity Logging; Formation Testing; Side Wall Coring; Dipmeter.

Southwest Oilfield Products Inc.

Booth 59, Oklahoma Building

PRODUCTS DISPLAYED:

Southwest Slush Pistons; Rods; Wedge Seal Rod Packing; Type LP Renewable Sleeve Pump Liners; Type HP Fluid Cylinder Heads.

H. K. Porter Co., Inc. Division W-S Fittings Works

Booths 22, 23, 24, 25, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Forged Carbon, Stainless and Alloy Pipe Fittings.

Justright Manufacturing Co.

Booth 17, S. and T. Building

PRODUCTS DISPLAYED:

Safety Electric Lanterns; Safety Flashlight; Truck Mounted Electric Lanterns; Safety Filling Cans, Oily Waste Cans.

Harnischfeger Corp.

Block 203, North Area

PRODUCTS DISPLAYED:

Truck Cranes; Crawler Cranes and Trench Hoe; Welding Equipment; Diesel Engine-Generator Set; Portable Hoists.

Bell Corporation

Booth 12, Silver Lane

PRODUCTS DISPLAYED:

Bell Automatic Weight Control; B-K Automatic Mud Weight Recorder.

Colorado Fuel and Iron Corp.

Booths 162-165, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Wickwire Rope and Seamless Tubular Goods.

Wichtex Machinery Co., Inc.

Block 208, North Area

PRODUCTS DISPLAYED:

Oil Well Servicing Equipment.

Reda Pump Company

Booths 50, 51, 54, 55

PRODUCTS DISPLAYED:

Oil Well Submergible Motor; Water Pumps.

Union Chain & Mfg. Co.

Booths 37, 38, California Building

PRODUCTS DISPLAYED:

Drive and Conveying Chains, Sprockets.

Dowell, Inc.

Dow Chemical Company
Block Y

PRODUCTS DISPLAYED:

Transistor-Powered Radio Safety Hat; Oil Field and Industrial Services; Chemical Laboratories; Jelflake to prevent circulation loss in drilling and cementing; Polydril to settle solids from water; Corban to minimize corrosion in all kinds of oil field equipment; Freflo to prevent and break water blocks in pores of oil reservoir; Industrial Cleaning Services.

Oil Center Tool Company

Booths 104, 105, Texas Building

PRODUCTS DISPLAYED:

Tubing Hangers; Tubing Heads; Christmas Trees; Wellheads.

Win-Well Manufacturing Co.

Blocks 6, 7, 8

PRODUCTS DISPLAYED:

Models 724-6C 7-Way, 424-6C 4-Way, 424-15C 4-Way, 736-6C 7-Way Rotary Selector Valves; Pump Valve Spacer; Safety Crank.

John Zink Co.

Block 108

PRODUCTS DISPLAYED:

Field Flares; Burners.

Armco Drainage & Metal Products, Inc.

Block R

PRODUCTS DISPLAYED:

Well Casing; Line Pipe; Steel Buildings.

Reich Bros. Mfg. Company, Inc.

South of Block 118, West Area

PRODUCTS DISPLAYED:

Model T-400 Exploration Drill.

HECO Division Hardwicke-Etter Company

Lot 10, South of Block 204

PRODUCTS DISPLAYED:

11 Ton Crane and ½ yard Backhoe.

C. W. McNeil, Inc.

83, 84, Texas Bldg.

PRODUCTS DISPLAYED:

Bearings; Pillow Blocks; Couplings; Fittings.

G & W Electric Specialty Co.

Booth 32, Silver Lane

PRODUCTS DISPLAYED:

Load Break Oil Switch; Solderseal and Capnut Type Potheads; Entrance Fittings; Aerial Lugs for Potheads; Splice Kits for Plastic Covered Communication Cable; Oil Fuse Cutouts.

National Tank Company

Block S, National Building

PRODUCTS DISPLAYED:

Oil Field Production Equipment; Valves; Controls; Couplings; Surface Casing.

Spartan Aircraft Co.

Block 120, West Area

PRODUCTS DISPLAYED:

Specialized Oil Industry Mobile Housing.

Hale Manufacturing Company

Booth 95, Oklahoma Building

PRODUCTS DISPLAYED:

Hale-O-Ring Butterfly Valves, Standard Valves.

Air-X-Changers, Inc.

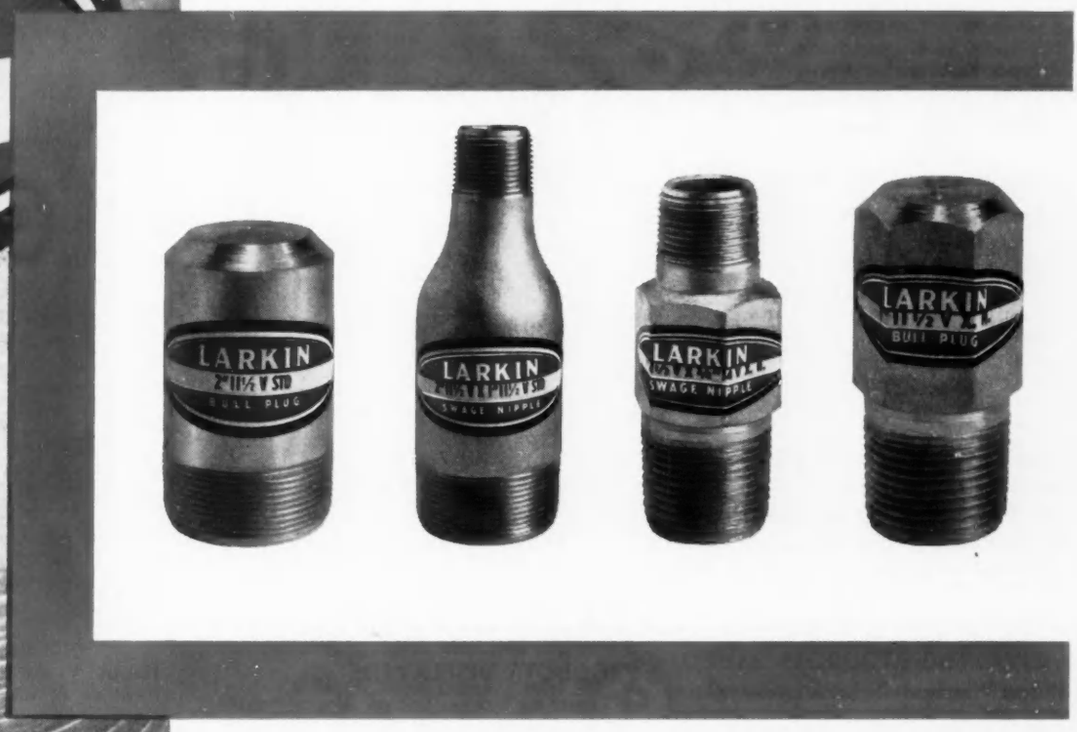
Booth 22N, North Area

PRODUCTS DISPLAYED:

Fan Cooled Heat Exchangers.

BUYING OR SELLING

Quality made Larkin the leader, and you can buy, or sell Larkin Fittings with full confidence that they are the finest fittings made.



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PARTNERS IN PETROLEUM PROGRESS

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...Through Your Supply Store

LARKIN PACKER COMPANY, INC.
WAXAHACHIE, TEXAS

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

Don R. Hinderliter, Inc.

Booths 87, 88, Texas Bldg.

NEW PRODUCTS DISPLAYED:

Multiple String Tubing Heads include 5½ x 2 inch EUE and 1 inch Tubing Head (Dual); 7 inch x 2 inch x 2 inch Tubing Head (Dual) 7 inch x 2 inch x 2 inch x 1 inch Triple String Tubing Head; 5½ x 1½ inch EUE x 1½ EUE (Dual) String Tubing Head.

Circle No. 226 on Postcard, Page 287

Dual String Stripper Rubbers: 2 - 2 inch Dual Stripper Rubbers for Tubing in 7-inch casing; 2-inch x 1½-inch DSR for tubing in 5½-inch casing.

Circle No. 227 on Postcard, Page 287

DRH-Type SW Tubing Head (3,000 pound test) has "O" Ring Lipped Packing Rubber.

Circle No. 228 on Postcard, Page 287

DRH-Type 3S-6S Tubing Head (4,000 pound test) has "O" Ring Lipped Packing Rubber.

Circle No. 229 on Postcard, Page 287

Stripper Rubbers for 4½-inch and 5½-inch casing.

Circle No. 230 on Postcard, Page 287

Plastic Hanger Tubing Heads.

Circle No. 231 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Tubing Spider; Slip-On-Weld Nipples; Combination Tubing and Casingheads; Tubing Hangers; Casing Supports; Casing and Tubing Head Adaptors; Safety Tubing Frogs; Commercial Heat Treating.

Wilson Manufacturing Co., Inc.

Block 201, North Area

NEW PRODUCTS DISPLAYED:

Wilson Titan Slush Pump has 1,250 maximum horsepower, chain drive, fabricated steel case, and 28 pounds per horsepower.

Circle No. 232 on Postcard, Page 287

Wilson Winchmobile has a cross-mounted engine and is a development in the field of self propelled well servicing winches and drilling rigs. It offers high efficiency with light weight.

Circle No. 233 on Postcard, Page 287

Wilson Spinning Tong for drill pipe.

Circle No. 234 on Postcard, Page 287

Wilson Breakout Makeup Device for Tool Joints eliminate lines and chains on the rig floor, and is designed for crew safety.

Circle No. 235 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Wilson Super Titan "56" Rig; Super Atlas Rig; Super Mogul "42" Rig; Mogul "42" Winchmobile; Super "38" Winchmobile; Super "38" Rig; Super "38" Winch, Truck Mounted, Giant Slush Pump.

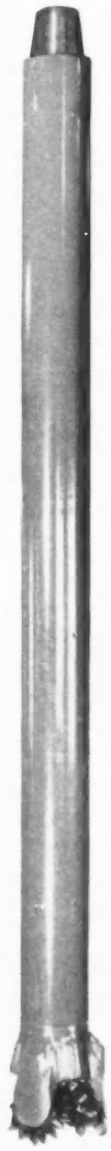
H. C. Smith Oil Tool Co.

Booths 10, 11, California Bldg.

NEW PRODUCTS DISPLAYED:

H. C. Smith Rock Bit Lubricator Sub is designed to reduce bearing wear resulting from abrasive action in the hole. Run immediately above bit on the drill string, the sub effectively lubricates bearings of rock bit during drilling operations, thus extends life of bearings for full life of bit.

Circle No. 236 on Postcard, Page 287



OTHER PRODUCTS DISPLAYED:

3-Cutter Rock Bits, Jet Circulation; 3-Cutter Rock Bits, air and gas circulation; 3-Cutter Rock Bits, Regular Circulation; Lubricated 3-Cutter Rock Bits; 4-Cutter Rock Bits; Hole Openers.

McKissick Products Corp.

Booths 245, 246, Okla. Building

PRODUCTS DISPLAYED:

Traveling Blocks, Tubing Blocks, Snatch Blocks, Construction and Crane Blocks.

The L. S. Starrett Company

Booths 226, 227, 228, Oklahoma Building

PRODUCTS DISPLAYED:

Oil Gaging Tapes and Plumb Bob, Mechanics' Hand Measuring Tools, Precision Instruments, Dial Indicators, Steel Tapes, Hacksaws, Hole Saws, Band Saws, Band Knives, Ground Flat Stock.

McFarland Engineering & Pump Co.

Booth 5, Texas Drive

PRODUCTS DISPLAYED:

Automatic Pipe Line Samplers, Chemical Injectors, Chemical Slugging Units, Hydrostatic Testing Pumps and units.

Johnston Testers, Inc.

Block 104

NEW PRODUCTS DISPLAYED:

Combination Test and Completion Tool uses tension type pressure recorder so sensitive it records pressure changes of as little as 5/100 of 1 percent. Rugged as a tool joint, the pressure recorder cannot be knocked out of calibration by operational handling. Bottom hole shut-in pressures can be taken without returning testing valve assembly to surface. Squeeze cementing, perforating, fracturing or acidizing can be done without pulling tubing or drill pipe. Operator can pump the pressure test section without making a round trip. All done in complete safety. Operations require only simple up-and-down movement or minimum of right hand torque. No damage can result from excessive rotation, and left hand rotation is never required. When operations are complete, a built-in jar assures packer unseating with no difficulty.

Circle No. 237 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Straddle Test Anchoring Device.

Quincy Compressor Company

Booth 38, North Area

NEW PRODUCTS DISPLAYED:

"Safe-Q-Lube" lubrication system protects compressor motors from starting overloads. The lubrication design also prevents excessive wear of drive belt during starts and stops and protects main roller bearings and connecting rod bearings.

Circle No. 238 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Complete line of Air Compressors—Air Cooled and Water Cooled, Single Stage and Two-Stage, 1 through 110 CFM.

The Happy Company

Booth Heart of Showgrounds, West of Block U

NEW PRODUCTS DISPLAYED:

Happy Floco Meters—for oil, salt water, or oil and water.

Circle No. 239 on Postcard, Page 287

Happy Floco Samplers—to secure cut percentage of oil and water.

Circle No. 240 on Postcard, Page 287

Happy Floco Well Tester—gas, oil and water producing rates.

Circle No. 241 on Postcard, Page 287

Happy Dacron V-Belts—low stretch, premium V-belts.

Circle No. 242 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Happy Cooling Equipment; Pumping Unit; Engine Starter; Gas Volume Tank; Wrist Pin Extractor; Mechanical Rubber Goods (hose, belting, floor matting); Kohler Electric Plant; Vortox Air Cleaner; Walker Wellhead; Little Giant Tubing Tee-Stuffing Box-PR Clamp; Adjustable Crank Guards; Allen Bradley Pumping Control Panel; Louis Allis Pumping Motor.

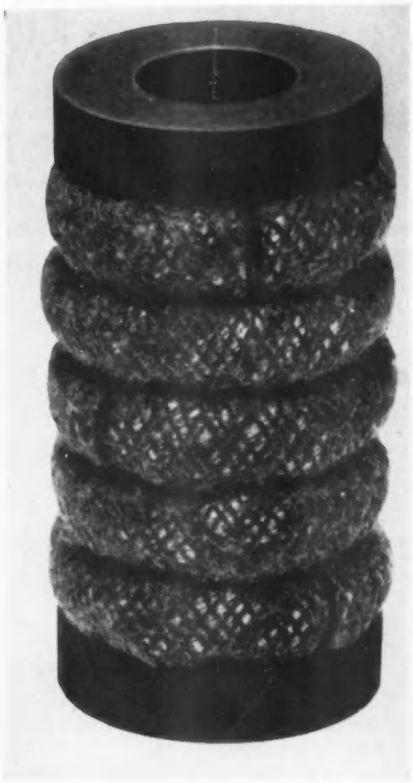
Axelson Division, U. S. Industries, Inc.

Block 104

NEW PRODUCTS DISPLAYED:

Axelson's Axite Plunger is hard-faced with nickel-chromium-boron material that is sprayed in molten state onto mild steel tube, then fused at 1,925° F. to form molecular bond with base metal. Resulting surface is almost as hard as a diamond, with a hardness of 9 on Mohs scale; diamonds have 10. Resists abrasion and corrosion, is impervious to salt water, extremely resistant to hydrogen sulfide, and provides maximum resistance to galling. For use in wells with extremely abrasive and corrosive conditions.

Circle No. 243 on Postcard, Page 287



Axelson's Marlo Hercules Packing will not harden or burn during pump-off, will not pit, wear or score moving parts, saves oil, eliminates down-time and resists salt or sulfurous waters. This polish rod packing is designed exclusively for Hercules stuffing boxes under Marlo patents and offers same advantages found in Marlo RW-6E sets for round stuffing boxes and Marlo packing for oval Ratigan stuffing boxes. Semi-metallic packing is integral component of all types and is composed of strands of special anti-friction alloy combined with strands of selected resilient fiber for body and spring. The result is slow-wearing, smooth, bearing-like, anti-frictional packing surface which can actually metallize the rod.

Circle No. 244 on Postcard, Page 287

Axelson's Duo-Hydrax Pumping Unit offers new method for dual zone production that is simple, flexible and economical. An Axelson double piston surface hydraulic pumping unit reciprocates two sucker rod strings at different depths, each of which operates a standard subsurface pump. A single reservoir supplies hydraulic fluid to two separate hydraulic circuits and these separate hydraulic circuits permit separate cycle rate for each zone.

Circle No. 245 on Postcard, Page 287

Axelson's Axite Sucker Rod Coupling decreases wear 50 percent in both coupling and tubing in wells with low water production, and more substantial reductions in high water cut, crooked hole and abrasive wells. Corrosion and wear-resistant coupling has friction coefficient of 0.10, far overshadowing hard steel's 0.40. Special oxygen-acetylene guns are used to drive molten, tri-metal, spray hard-surfacing onto coupling surface. Entire assembly is then fused at temperature of 1,925° F., where metal particles form molecular bond with base metal. Surface has porosity of approximately two percent and contains microconstituents attaining hardness of 9 on Mohs scale.

Circle No. 246 on Postcard, Page 287

Axelson Two-Zone Pump provides practical, economical solution to the problem of producing from dual completed wells where co-mingling of separate zone fluids is prohibited. Installations require only one surface pumping unit and one string of rods. Pump is insert-type, therefore completely retrievable. All pump parts are standard items with exception of cross-over assembly, including metal-to-metal seal used on the pump.

Circle No. 247 on Postcard, Page 287

Axelson's Volumax Pump is particularly applicable where large volumes of fluid must be lifted. The Volumax is ideal for water drive wells where water encroachments require high gross for an established net oil production. It is equally adaptable to water flood wells and to edge wells which require high water production and permit higher net oil production in upstructure wells.

Circle No. 248 on Postcard, Page 287

Band-It Company

Booths 82, 129, Okla. Bldg.

NEW PRODUCTS DISPLAYED:

Band-It Brack-It is a stainless steel mounting bracket for mounting signs and other objects to poles, pipe, tanks of any size or shape.

Circle No. 249 on Postcard, Page 287

Swaged Hose Nipples' exclusive Band-It design offers sealing characteristics with maximum amount of flow.

Circle No. 250 on Postcard, Page 287

Band-It ¼-inch Big Hole Quick Coupler is a small, fast acting coupler delivering the maximum amount of flow.

Circle No. 251 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Industrial Pressure Clamps (Standard & Preformed); SCRU-LOKT Buckles; Band-It Clamp Warehouse; Hose Nipples; Menders; Unions; Hose Nipple Pushers; Pneumatic Air Tool; Clamp Remover.

Marsh & Marine Mfg. Company, Inc.

Booth 3, Block 1E, East Area

NEW PRODUCTS DISPLAYED:

Aluminum and Fiberglass Portable Camp House for locations where temperature is extremely hot or cold. The camp designed for the tropics has walls of resilient fiberglass and nylon materials, and roof made of four aluminum panels. The cold weather camp has side walls made of special glass combined with honeycomb material. Though only ⅝ inch thick, they have insulation strength of an 8-inch solid brick wall. Either camp can be assembled or disassembled by two men in 15 minutes without use of tools, nuts or bolts. All component parts join with self-contained fasteners that require only one-half turn to lock them in position.

Circle No. 252 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Portable Camps, Pressure Geophones, Geophysical Equipment, Geophysical Cables, Chemical Coatings.

Woodward Governor Company

Booth 82, S. and T. Building

NEW PRODUCTS DISPLAYED:

Woodward Type LSG Load Sensing Speed Governor, for use on engine and turbine driven generator sets, permits smallest possible change in speed that can be obtained for any given load change on a particular engine. It combines in compact housing, a high performance, mechanical-hydraulic governor of established reliability and equally rugged means of rapidly positioning the engine throttle as function of speed.

Circle No. 253 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Cutaway models of engine governors UG8, UG32, PG Dial, PG PL.

Otis Engineering Corp.

Booth 113, Texas Building

NEW PRODUCTS DISPLAYED:

Otis Isolation Packer permits the setting and testing of each packer individually and is designed to withstand a differential of up to 5,000 psi.

Circle No. 254 on Postcard, Page 287

Otis Dual Flow Choke is wire line tool which permits producing and prorating two or more zones in single tubing string without commingling in the well bore. Used in conjunction with isolation packer, it will reduce drilling and production costs and further development of slim-hole completions.

Circle No. 255 on Postcard, Page 287

Otis Type "G" Ball Surface Safety Valve is designed for flow lines, has a through conduit with 1⅜-inch bore, and is simple to install, set, and keep in service.

Circle No. 256 on Postcard, Page 287

Otis Type "E" Hi-Lo Surface Valve Pilot incorporates both high and low pressure operations into single fixture, and both the pilot and surface safety valve can be reset by turning an external sleeve. A red band is exposed when valve is out of service, and an indicator discloses whether the high or low pilot has operated.

Circle No. 257 on Postcard, Page 287

Otis Type "X" Surface Safety Valve is available on Cameron, WKM, and McEvoy valve bodies, can be equipped with Type "E" Pilot.

Circle No. 258 on Postcard, Page 287

Otis Pressure-Operated Sub-Surface Tubing Safety Valve is through-conduit, ball-type, fail-safe, tubing safety valve. It is adaptable to wells with serious sand problems, or where well pressures or volumes are apt to decrease. Can replace the Type "F" Storm Choke.

Circle No. 259 on Postcard, Page 287

Otis Bomb Hanger is designed to run bottom-hole pressure bomb into flowing well and then shut in the well immediately above the bomb (rather than at the surface). Reduces time required for build-up tests.

Circle No. 260 on Postcard, Page 287

Otis-Maihak Surface Recording Bottom-Hole Pressure or Temperature Gage incorporates pressure or temperature measuring device installed at bottom of tubing string with wire connection to a portable surface sensing unit. The equipment makes it possible to obtain instantaneous or continuous bottom-hole pressures or temperatures.

Circle No. 261 on Postcard, Page 287

Otis Bottom-Hole Intermitters are of two types: Differentially-operated and pressure-operated. Both tools are designed to unload fluid before it kills a gas well.

Circle No. 262 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Drill Pipe Plug, Thread Dope Squeeze Service, Tubing Service, Caliper Service, Sliding Side-Door, Selective Nipples and Related Sub-Surface Flow Controls, Gas Lift Valves, Sub-Surface Tubing Safety Valve (Type F), Surface Safety Valves, Auxiliary Surface Control Equipment.

Bucyrus-Erie Company

Booth 4, 1-E, Outside East Gate

NEW PRODUCTS DISPLAYED:

Bucyrus-Erie 10-R Truck Mounted Table-Drive Rotary Drill can be used for exploration and seismograph prospecting. It will drill 4¼ to 5⅝ inch holes to 1,000 feet. Air or mud bailing is used. Mounted on International Harvester or GM truck, the 10-R is driven by truck engine with Bucyrus-Erie split-type power takeoff. Weight of unit with truck is 25,000 pounds. The 33-ft. high mast handles 15-ft. pipe sections; optional 38-ft. mast handles 20-ft. pipe sections. Pipe rack holds 10 lengths of pipe.

Circle No. 263 on Postcard, Page 287

Bucyrus-Erie 120-SL Self Contained Well Servicing Unit services oil wells to 12,000 feet. It is rugged, compact drive-in unit with full highway mobility. Has power steering, air brakes and one man cab offering full road visibility. 120-SL's butane burning, heavy-duty industrial engine will handle all power requirements. Other features of advanced drawworks construction: Multi-speed and interchangeable main and sand line drums; self-equalizing mechanical brakes; detachable, hardened brake flanges; and outboard mounted air clutches. Unit has 55-ft. structural telescoping mast, main transmission is air shifted at operator's station.

Circle No. 264 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Bucyrus-Erie 45-ton 30-B transit crane, ¾-yd. highwalker hoe.

Rockford Clutch Division Borg-Warner Corporation

Booths 74, 75, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Rockford Heavy-Duty Long-Life Oil Field Type Engine Power Take-Off Assembly; Rockford Heavy-Duty Gear Reduction Assembly; Rockford Morlife Two Plate Clutch; Borg-Warner Full Power Shifting Transmission for Heavy-Duty Equipment; Borg-Warner Haulmaster Converter.

Westinghouse Electric Corp.

Booths 91, 92, 93, 118, 119, 120, Okla. Bldg.

PRODUCTS DISPLAYED:

Electric Drilling Motor; Pumping Motor; Motor Controls; Gearmotors; Industrial Gas Turbine.

Cummins Sales & Service, Inc.

Block 3, Mid-Continent Bldg.

NEW PRODUCTS DISPLAYED:

Cummins J-70 GA-30 KW Generator Set is used to provide electric power and lights for drilling rigs. It is a Marathon generator powered by J-70 Cummins four-cylinder, naturally aspirated diesel engine rated at 70 horsepower, at 2,000 rpm.

Cummins Air Actuator is synchronized air throttle control for two or more compounded engines. It controls fuel setting and engine speed, thus providing for the smoothest, most efficient, and most economical use of each engine's power.

Circle No. 265 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Wahlberg-McCreary Air-Gas Starter; Cummins Corrosion Resistors; Stay Ready Oil Filters; Petroleum Solvents, Cleaners, Penetrants, Degreasers, fuel conditioners.

American Iron & Machine Works

Booths 159, 160, 161, Oklahoma Bldg.

NEW PRODUCTS DISPLAYED:

American Iron Tension Tubing Anchor is completely retrievable under all conditions. It increases service-life of rods and tubing; increases fatigue-life of tubing; increases efficiency of pump; decreases tubing connection wear; decreases rod-on-tubing wear and decreases horsepower input requirements.

Circle No. 266 on Postcard, Page 287

American Iron Slush Pump Piston has taper bore ground to precision tolerance for perfect adhesion to rod. One-piece piston body is fully heat treated, precision machined to extra close tolerance to hold clearance at minium. Rubber compound is highly resistant to heat, oil and abrasives. Ring holds plate at 90° angle, assuring positive pressure.

Circle No. 267 on Postcard, Page 287

American Iron Packers are interchangeable, making it possible to assemble 24 different type packers from three basic types. Packers seal pressures in excess of 8,000 pounds at 300° F.

Circle No. 268 on Postcard, Page 287

American Iron Packer Holddown (Type "HDB" Hydraulic-Mechanical) holds even with extreme bottom hole pressures. It is recommended for high pressure acidizing, formation fracturing, and waterflood input wells. Can be released without first equalizing pressures above and below packer.

Circle No. 269 on Postcard, Page 287

American Iron Light Weight Open-Hole Tool Joints are designed for use on light weight drill pipe and tubing. Available in Straight Grip, Flash Welded and Bucked-On Types, tool joints are light, have long wear-life, and thread design which provides slower taper, making it possible to use full length of pin and maximum radial shoulders.

Circle No. 270 on Postcard, Page 287

General Electric Company

Booth 39N, North Area

PRODUCTS DISPLAYED:

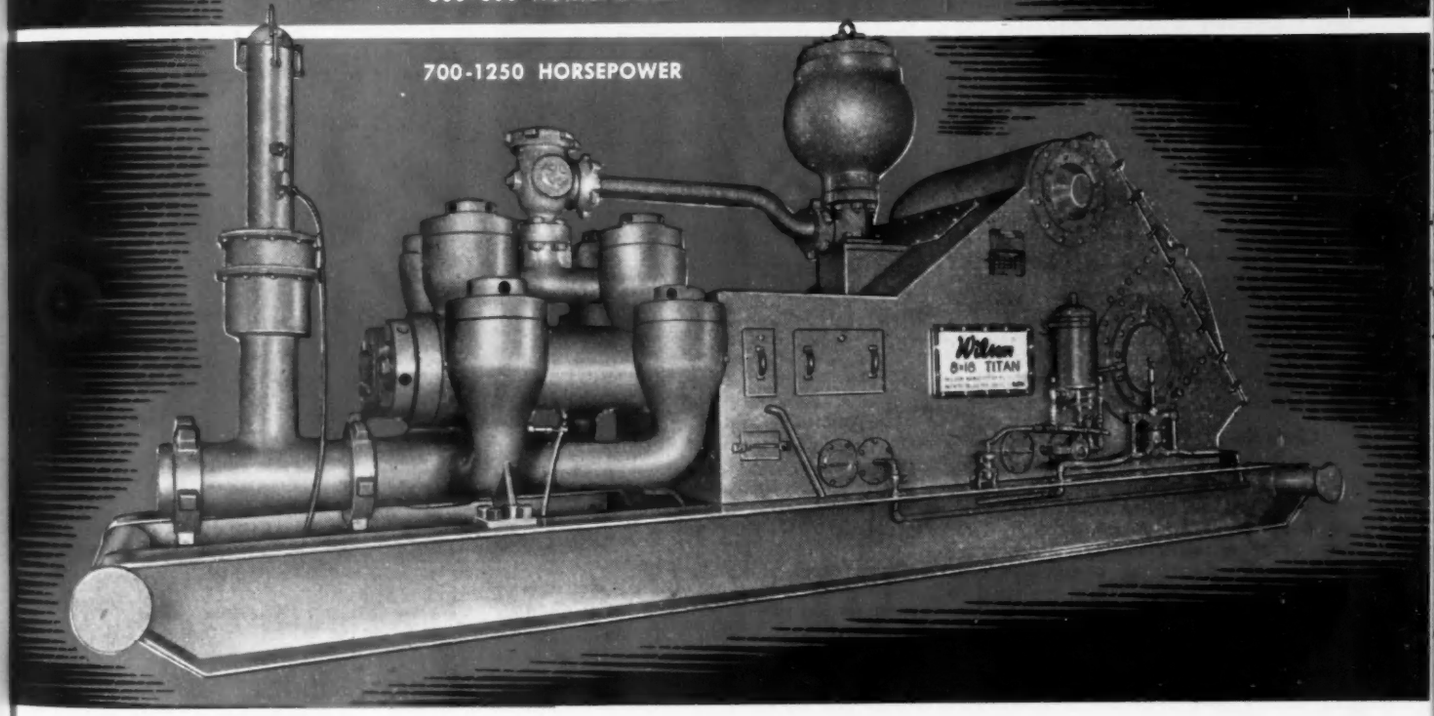
Small Alternating Current Motor designed for oil field pumping applications; Small Power Capacitors to maintain reactance for motors used with electric drilling system; Three Phase, Oil-Filled Distribution Transformer; Motor Controlled Apparatus; New Electric Power Distribution Transformer; Electric Drive System Drilling Rig.

Circle No. 271 on Postcard, Page 287

The Pumps That Give You

- More Horsepower Capacity Per Dollar!
- More Horsepower Capacity Per Pound of Weight!
- More Mud Pressure with the Same Horsepower!

300-600 HORSEPOWER



700-1250 HORSEPOWER

and on which you will have

- Less Down Time
- Less Expense for Repairs
- Less time out to change valves, pistons, rods, liners, etc.

NOW PROVED BY FOUR YEARS OF FIELD USE — More than a score of Wilson Pumps are now in use — all giving complete satisfaction. The next time you need a pump, call your nearest Wilson Salesman, or call the factory collect. Get our proposition before buying any pump!

Wilson

WILSON MANUFACTURING COMPANY, INC.

WICHITA FALLS, TEXAS, U.S.A. The Home of RED IRON

BE MODERN — BUY WILSON

Black, Sivalls & Bryson, Inc.

Booths 39-43; 62-66, Calif. Bldg. and Block 208, North Area

NEW PRODUCTS DISPLAYED:

BS&B Phanto-Matic Lease Automation System, complete from wellhead to pipe line, and controlled remotely through well test programer and LACT programer, will be in operation. Simulated production from four wells is routed to production or test through 3-way routing valve manifold. One well is tested for fixed period of time from remote control station and its production routed through metering separator. Production from other wells is routed through standard production separator. In test separator, oil, water and gas is metered and data stored for transmission back to central station upon completion of test. Gas from production and test separators is recombined and flows to gas pipe line. Oil and water produced flows through production treater where it is separated. Oil flows to lease tank for weathering. On programed basis, oil flows from stock tank through an ACT unit into pipe line. Oil is monitored for quality. If oil is bad, it is rerouted for retreating. Data and control of custody transfer system is effected at central control station.

Circle No. 272 on Postcard, Page 287

BS&B Spherical Separator—Indirect Heater Assembly is skid-mounted unit designed principally for cold weather operation in which gas stream must be reduced from wellhead to pipe line pressure. Gas flows through coils in indirect heater where temperature is raised prior to going through a choke to prevent formation of hydrates. Flow may go directly into spherical separator or pass through another set of coils in the indirect heater to melt any hydrates formed during expansion across choke. Liquids separated in spherical separator drop to lower chamber located in water bath of heater. Oil and water are separated and discharged through respective dump valves. Lower chamber of separator is located in indirect heater to keep water from freezing, and restricting or shutting-in production.

Circle No. 273 on Postcard, Page 287

BS&B Dry-Frac Quick Cycle Hydrocarbon Recovery Unit is available in two-tower or three-tower systems with choice of either closed-cycle or open-cycle type of regeneration system. Units are sized to meet requirements of any well stream. Towers are sized and regeneration system set to allow 22½-minute cycle. In 3-tower systems, each tower is placed on absorption, heating or cooling cycle in sequence for most efficient operation at lowest initial cost. In closed system, gas is recycled through cooling and heating systems to provide maximum recovery, since reactivation gas is always flowing in closed loop and never contacts main gas stream. No pressure drop is required for operation other than that occurring while flowing through equipment.

Circle No. 274 on Postcard, Page 287

BS&B Filament Wound Fiber Glass Tanks offer new approach to solution of corrosion-resistant tanks. Tank is manufactured by winding continuous filaments of glass rovings impregnated with epoxy resins over mandrel cured by addition of heat and stripped from mandrel in one piece, providing uniform structure. High strength of structure results from winding process wherein glass content is in excess of 75 percent. Available in sizes up to and in excess of 12 feet, with diameter restrictions set up mainly by transportation limitations. Fittings, manways and cleanouts can be added to tanks.

Circle No. 275 on Postcard, Page 287

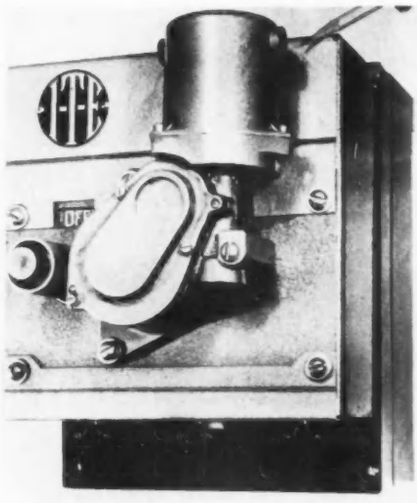
OTHER PRODUCTS DISPLAYED:

Lease Metering Equipment; Econ-O-Max Steam Generator Assembly; High Pressure Dump Valves with Time Cycle Controller; Lease Automation Valves; Pressure and Temperature Controllers; Liquid Level Controllers; Butterfly Valve; Safety Head.

I-T-E Circuit Breaker Company

Booths 22, 23, S. & T. Building

NEW PRODUCTS DISPLAYED:



Telemand Breaker Operator makes possible remote control of automatic transfer systems with molded-case type of circuit breaker used to protect low voltage circuits. Designed for use on molded-case breakers, electrical switchboards, control centers, and individual enclosures, it can be wired for any operational system and mounted on new or existing I-T-E molded-case breakers, adding only six inches in depth, without removing them from service. Models available in continuous current ratings of 70 through 800 amperes and voltages up to 600 volts a-c and 250 volts d-c.

Circle No. 276 on Postcard, Page 287

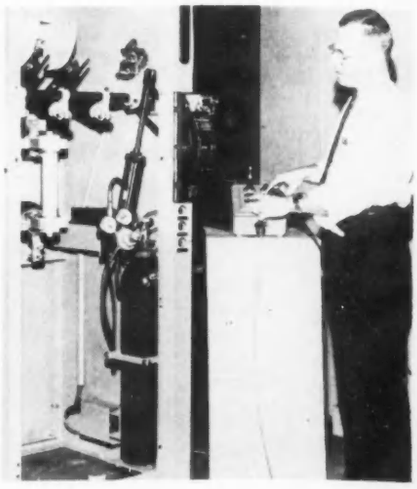
Morse Chain Company

Booths 14, 15, 16, Silver Lane

NEW PRODUCTS DISPLAYED:

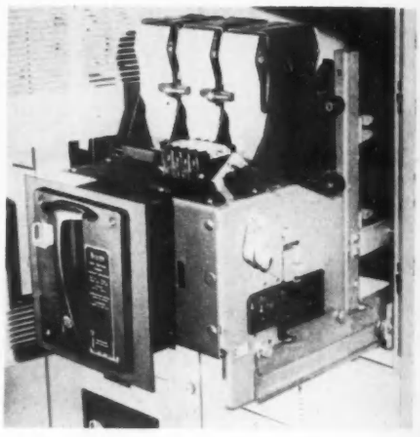
Morse Hy-Vo Chain; H-E (High Endurance) Chain Flexible Couplings; Clutches; Timing Belt Drives; P.T.O. Shafts; Speed Reducers; Roller Chain and Silent Chain; Sprockets.

Circle No. 279 on Postcard, Page 287



Pneumatic Switch Operator provides low cost system which can accommodate any scheme of remote or automatic control of its HPL-C interrupter switches used to protect high voltage lines. Features include double-acting air motor, linkages, solenoid valve and air cylinder; and can be used on any HPL-C switch from 600 to 2,000 amperes in 2.4 through 14.4 kilovolts.

Circle No. 277 on Postcard, Page 287



K-Line Low Voltage Power Circuit Breaker and Switchgear offer simplified operation and servicing through many new design features.

Circle No. 278 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Transformer Coil and Coil Assemblies, Cordon Circuit Breaker.

Martin-Decker Corp.

Block 4, Reed Building

NEW PRODUCTS DISPLAYED:

Mud Pressure Gages, Electric Recording Systems.

Circle No. 280 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Rig Instrumentation.

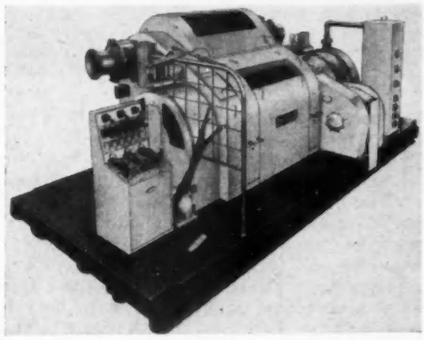
Oil Well Supply Division
U. S. Steel Corporation

Block 2

NEW PRODUCTS DISPLAYED:

"Oilwell" Lever-Lift Mast consists of top, center and bottom sections, and has gross nominal API capacity of 625,000 pounds. Rated hook-load capacity is 400,000 pounds with eight lines to the block. Fast line and dead line are outside mast, giving extra working room inside. Substructure spacer beams and rotary table frame fasten to main subbase units with boltless wedge-lock beam connectors and "T" fasteners. Mast is assembled at ground level. Sections are connected by patented wedge-lock units, which can be assembled or disassembled with hammer, and "T" fasteners which remain in place when mast is dismantled for moving. New lifting principle speeds erection. Wide-spread, tapered, trussed rear legs are designed to provide maximum vision, working room and stability.

Circle No. 281 on Postcard, Page 287



"Oilwell" 760 Draw Works is designed for 7,000 to 12,000 foot drilling range. Powerflow scheme is simple, time-proved design used in other "Oilwell" draw works. Designed to cut maintenance costs, the 760 housing has convenient oil-tight, quick opening inspection doors. Shaft assemblies are designed for speedy removal. Large openings to transmission area make servicing easy. Driller's console provides full air control of clutch shifting, catheading and engine throttling. Control panel has pushbutton throttle compounding arrangement, permitting hand or foot throttle control of engines as required by the driller. "Oilwell" 1,100 Three-Engine Drive powers the 760.

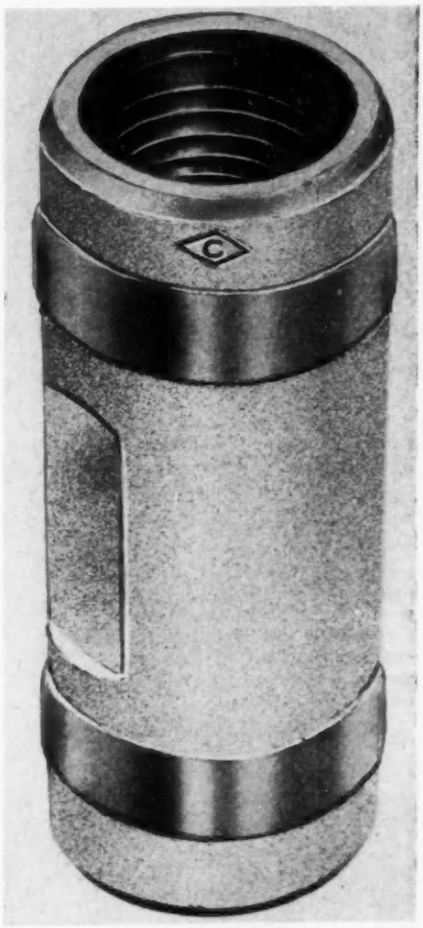
Circle No. 282 on Postcard, Page 287

"Oilwell" 1000-P Power Slush Pump has 18-inch stroke length with 8-inch maximum liner diameter. Rated horsepower input is 1,000 at rated speed of 65 rpm. Unique power end design retains true overhung-crank construction within narrow width limits formerly possible only with eccentric-type construction.

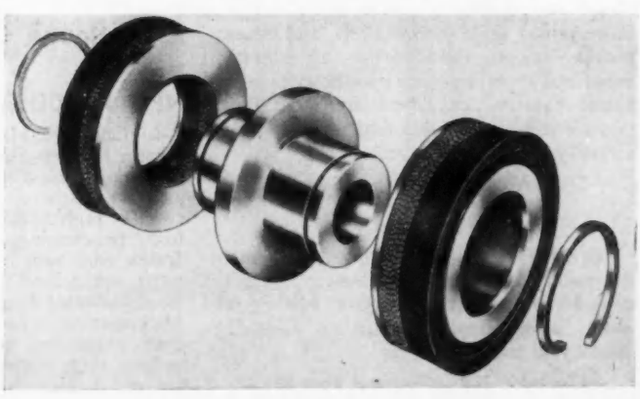
Circle No. 283 on Postcard, Page 287

Wilson-Snyder 4-on-1 Pistons have numerous features, including: Exclusive design, making it possible to install four different piston rubber sizes on one piston body; carefully blended piston rubber compound of top quality; support-and-wear ring of steel bonded to rubber which provides solid backing against any pressure; reinforcing fabric that gives rubber further protection against pinch-off; end-support ring of high carbon steel; spring-steel snap rings that fit in grooves in body and hold rubber snugly against body flanges; forged-steel body with almost unlimited service life, as it makes no liner contact; individual cylinder heads and valve covers; individually replaceable, screw adjusted, stuffing boxes.

Circle No. 284 on Postcard, Page 287

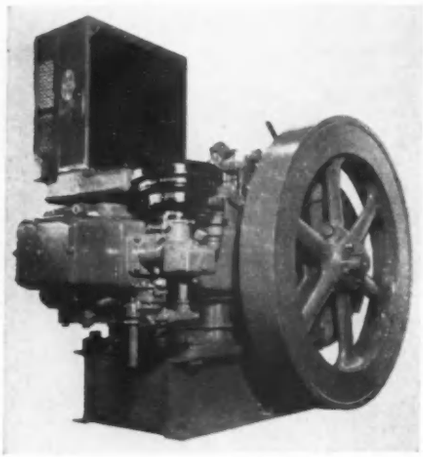


"Oilwell" Co-Hard Sucker Rod Couplings have alloy steel body heat-treated for toughness with twin bands of hard facing Co-Hard. Coupling is held away from well tubing by these bands so the body remains maximum size to withstand continuing heavy loads. Co-Hard furnishes premium characteristics of maximum



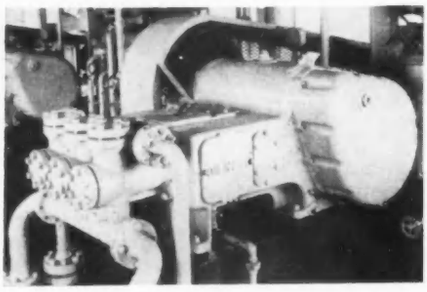
strength, wear resistance and corrosion resistance. Coupling can be beaten with wrench and will not crack. Zinc coating protects each coupling while in storage. Ideal for ⅞-inch "slim hole" operations.

Circle No. 285 on Postcard, Page 287



Witte F-42 and C-19 Power Units are four-cycle, single cylinder, horizontal liquid-cooled engines. F-42 is designed for continuous heavy-duty operation with horsepower rating of 42 at 750 rpm, and C-19 with rating of 19 hp at 750 rpm. They are both completely weatherproof and can be operated year around without protective enclosure. Both sizes are extremely smooth-running through their entire speed and horsepower ranges. This characteristic provides maximum installation flexibility on structural-steel pumping unit bases.

Circle No. 286 on Postcard, Page 287



"Oilwell" 336-P Waterflood Pump is designed for high pressures (up to 2,040 psi), making it suitable for waterflooding, acidizing, cementing and some fracturing operations. Features which make maintenance easy include: horizontal design; large power end access covers and doors; outside access for bearing adjustment; crosshead shoes; separate crosshead-plunger shank construction; open frame cradles; two-piece plungers; interchangeable, individually removable valves.

Circle No. 287 on Postcard, Page 287

Nitriline Subsurface Pumps are designed for mildly corrosive wells where there is considerable abrasion. Inside surface of barrel is hardened by patented "Oilwell" Nitrocycle process.

Circle No. 288 on Postcard, Page 287

Pumping Units in new "Oilwell" Century Series include 320G30, 160G21, 80G14, and 40G9 sizes, with features which provide dependability under all operating conditions; assure maximum safety to personnel in maintaining unit; simplify maintenance procedures to save time for operator and to minimize maintenance expense; allow customer widest choice of unit sizes and prime movers through proven design flexibility; duplicate the large number of desired features in every unit size.

Circle No. 289 on Postcard, Page 287

Hi-Hard Fluid Cylinder Liners are made exclusively for use in "Oilwell" and Wilson-Snyder slush pumps. Liners are seamless steel forgings accurately machined, ground and flame hardened. Bores are precision ground to mirror finish, thus reducing initial wear and resisting sand abrasion which might score liner or piston. Accurate bore diameter meets API specifications.

Circle No. 290 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

No. 10 Automatic Feed Control; S-225 Swivel; 200-B-150 and 250-W-250 Block Hooks; Super 48-P Triplex Plunger Pump unitized with GM 6-110 Twin Engine; Slush Pump Fluid-End Parts; 20½ Oilbath Rotary; DGE-125, OWL-40 Packaged Compressor Units; 334-P, 358-P, 558-P Plunger Pumps for waterflood service; Subsurface Pumps: Di-Hard, Krom-I-Dee, Spun Metal, Hi-Brin, Silverline, 3-Tube for sandy wells; Sucker Rods, Grades "N," "L," "T," "Y"; Sucker Rod Couplings, Grades "S", "H"; B-12 Witte Engine for pumping unit applications; 246-P Duplex Pumps unitized with engine.

McCullough Tool Company

Block 104

NEW PRODUCTS DISPLAYED:

McCullough Mac-Jet Thru-Tubing Perforator features enclosed firing system that eliminates prima-cord exposed to well fluid and will operate effectively under extremely high hydrostatic pressures. Having high penetrating ability and Well Flow Index, each unit is fully self-contained and units are joined together to form perforator of any required length. Standard Shot spacing is four holes per foot. Three-inch explosive spacers are available to reduce shot density as desired. Units and spacers are specially designed to break-up into small pieces, assuring minimum amount of debris—about 1 inch of fill-up per 1 foot gun in 5½-inch O.D. casing. Other features include flexible construction, bottom firing, resistance to high temperature. Available in $1\frac{11}{16}$ inch O.D. and $2\frac{1}{16}$ inch O.D. sizes.

Circle No. 291 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

McCullough Nuclear Well Logging (Scintillometer) equipment featuring improved Neutron Log; Salinity and Density Logging Services; Magna-Tector (Free Point Finder); Chemical Tubing Cutter and Perforator; Bridge Plugs.

Franks Machine Company

Block 104

NEW PRODUCTS DISPLAYED:

Franks Model 60 Portable Rig (largest in Frank's Line) for exploration, shot hole and shallow production drilling is designed for fast moves and efficient operation. Rig mounts on special, heavy duty trailer frame powered by single horsepower engine. It is equipped with 18-inch or 12-inch opening rotary table. Convenient, air-operated controls are compactly mounted in console on left side of drawworks. Unit has exceptional range of hoisting and rotating speeds. Drill is equipped with one-piece seamless alloy tubing derrick which stands 60 feet above rotary table. Drawworks is completely enclosed. Unit is designed to handle 75,000 pound drill pipe load with maximum hook load capacity of 100,000 pounds under average drilling conditions.

Circle No. 292 on Postcard, Page 287

The Bovaird Supply Co.

Block 1

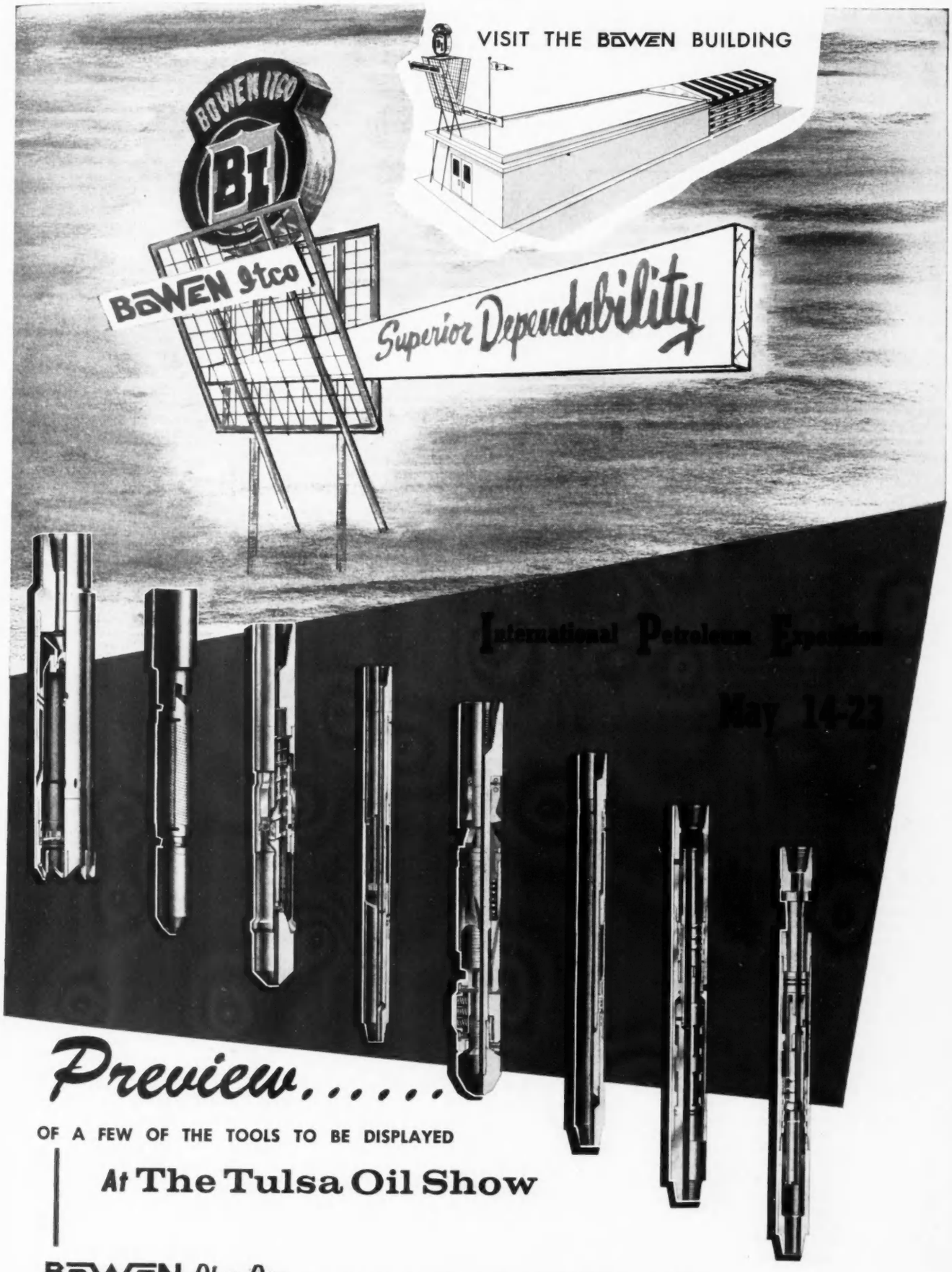
NEW PRODUCTS DISPLAYED:

Johnston Hydraulic Pumping Unit.

Circle No. 293 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Brewster: Model N-45 Drawworks with GM Twin Model 12107 Diesel Engine, Model RSH-18 Rotary Table, 150 Ton Traveling Block with 4-36 inch Sheaves, Model 7S Swivel; Continental-Emsco: Model D-550 Power Slush Pump, Model DB-16-53-30 B Unit Pumper, Model DF-80-133-54 Unit Pumper; Byron Jackson: 150 Ton Unimatic Hook, 2¼-inch by 98-inch Weldless Elevator Links; Web Wilson: T-150 "Champion" Center Latch Elevator, Type B Rotary Tongs; Ben F. Kelly: Power Slips, Kelco Model "12" Spinning cathead; Mission: Slush Pump Accessories; American Iron & Machine Works: Slush Pump Accessories, American Universal Model "55" Breakout Cathead; Hughes: Tool Joints, Rock Bits, Reamers, Drill Collars, Kellys; Reed: Tool Joints, Rock Bits, Reamers, Drill Collars, Kellys; National Tube Division, U.S. Steel: Drill Pipe; S. M. Jones: Sucker Rods; W. C. Norris: Well Head Equipment, Sucker Rods; Pacific Pumps; Sub Surface Pumps; Baker Oil Tools: Float Equipment; Larkin Packer: Float Equipment; Cameron Iron Works: Christmas Trees, Well Head Equipment; Walker Well Heads Co.: Well Head Equipment; Worthington Corp.: Model VTE Worthington Vertical Triplex; Gardner Denver: Model PG-3 Horizontal Triplex Pump.



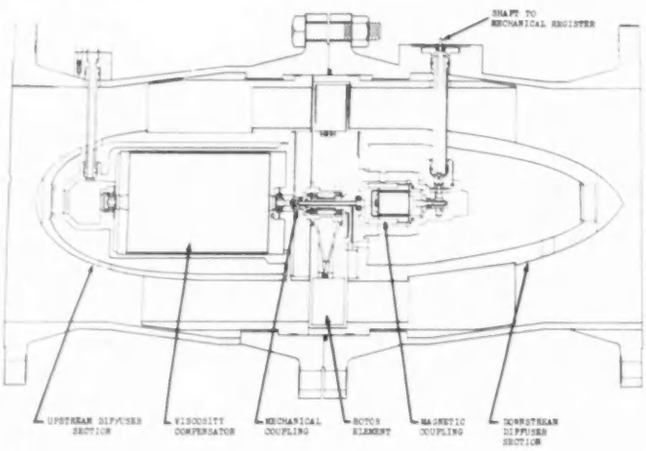
BOWEN Itco, Inc. • P. O. BOX 4587 • HOUSTON 13, TEXAS

Manufacturers of Equipment for DRILLING • FISHING • PRODUCTION • COMPLETION • WIRE LINE OPERATIONS

Rockwell Manufacturing Co. Booths 33-38, S. and T. Bldg.

NEW PRODUCTS DISPLAYED:

Rockwell "Turbometer" is 16-inch, 15,000 bph capacity positive screw displacement meter. Features include: Accuracy of better than 15 parts in 10,000; handles liquids of up to 500 SSU viscosity; repeatability of better than one part in 5,000; applicability for any liquid service; range from crudes to finished product with same unit without need for adjustments to suit change in line liquid. Other features include rotor metering element weighing only four pounds, new viscosity compensator, magnetic coupling completely sealed from line product. Unit is powerful enough to actuate all standard meter accessories, yet so delicate in response a person blowing into open end of Turbometer will cause rotor metering element to rotate.



Circle No. 294 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Nordstrom Dual Completion and Recessed Body Valves; Planetary Gear Operator for Wrench Operated Hypreseal Nordstrom Valves; 2-inch 1,000 #WOG Round Opening Steel Inverted Nordstrom Plug Valve; Special Coatings for Nordstrom Valves for corrosive services (Teflon, K-51 Penton, Kanigen). ⅝ inch and 1 inch "5" Pointer Meter; T-70 Tank Truck Meter; Fixed Adjustment Gland for Nordstrom Valves; Nordstrom Hypreseal Valves with new stem construction.

Mission Manufacturing Co.
Booths 91-93, 118-120, Texas Building

NEW PRODUCTS DISPLAYED:

Hammerdril Pneumatic Tool can drill up to 30 feet an hour in granite. This bottom hole impact tool has only two moving parts in the high pressure tool and only three moving parts in the low pressure model. Impact parts are heat-treated high-alloy steel. Massive tungsten carbide inserts can be resharpened in the field. Moving parts are friction and wear resistant.

Circle No. 295 on Postcard, Page 287

Mission Lightweight Rig Slips have strength to spare, but no excess weight. Renewable hinge pins mean long life. New, positive lock Rolling Dog inserts let slips do the job of overweights, handling drill pipe up to 12,000 feet in sizes from 3½ to 4¾ inches. Segments are self leveling as insurance against crimping the pipe. Post Construction is sturdy to allow heavy elevator blows to be absorbed without damage to slips or handles. Flexible handles bend rather than break.

Circle No. 296 on Postcard, Page 287

Mission Mark 1 Cup Type Swab is companion to highly successful E-Z Swab. Both Mark 1 and E-Z Swabs use same mandrel, reducing parts inventory. As conditions in the well change, the operator is able to change quickly and easily from one type swab to another. Other features: Free falling, no metal is in contact with tubing wall at any time.

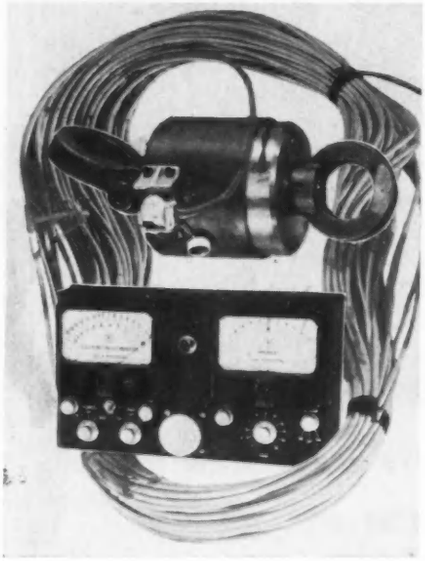
Circle No. 297 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Slush pump parts, valves.

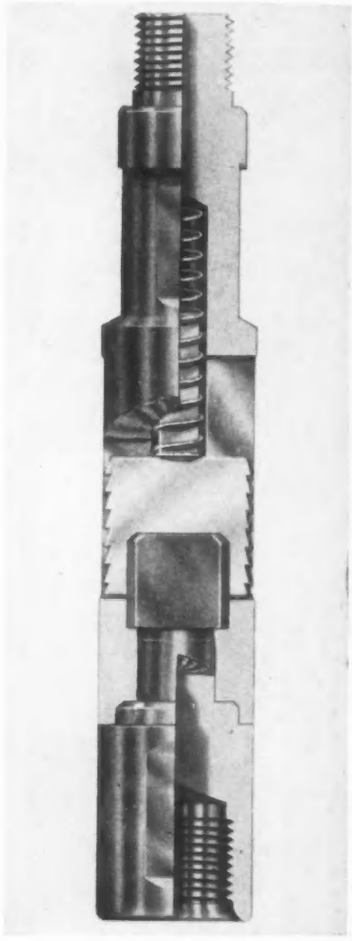
Bowen Itco, Inc.
Block V

NEW PRODUCTS DISPLAYED:



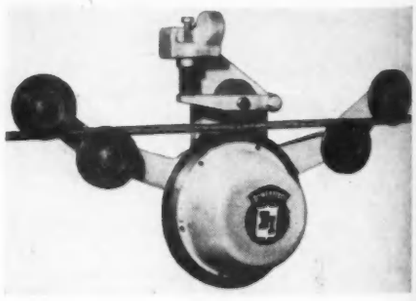
Bowen Electronic Weight Indicator is companion instrument to Line Measuring Device. It is an accurate, sensitive weight measuring instrument (accurate to within 2 percent of full scale) available in six weight ranges from 1,000 through 20,000 pounds. Indicators are completely self-sufficient due to their built-in power supply, long lasting through use of transistorized circuits, and furnished in attractive black metal case, complete with mounting flange to facilitate installation in service truck panels.

Circle No. 298 on Postcard, Page 287



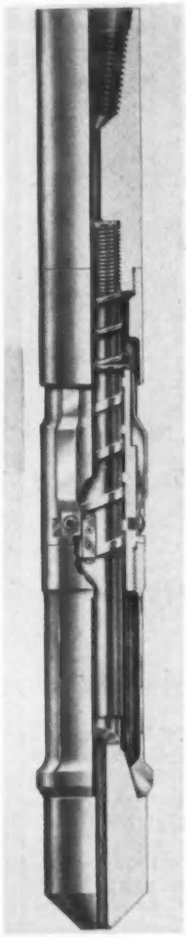
Bowen Quick Lok Wire Line Coupling eliminates need to remove tools from lubricator before they can be changed. Quick Lok is rugged tool, fully capable of withstanding severe strains and shock loads—even those encountered when jarring.

Circle No. 299 on Postcard, Page 287



Bowen Line Measuring Device is an electric measuring instrument which gives extremely accurate depth reading, is light, requires no serious adjustment to compensate for line change (will accept all popular sizes) and does not bend or otherwise impose undue wear and tear on line.

Circle No. 300 on Postcard, Page 287

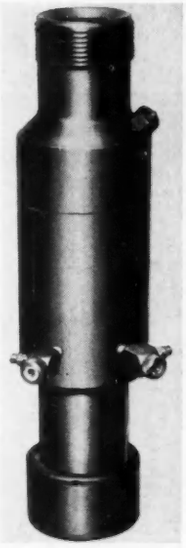


Bowen Packer Retriever is designed for removal of "Drillable" type production packers, provides safety while milling a packer's slips and sealing element. Retriever is available with following optional components: Milling Shoe, Stinger, Bushing, Safety Joint, and Junk Sub.

Circle No. 301 on Postcard, Page 287

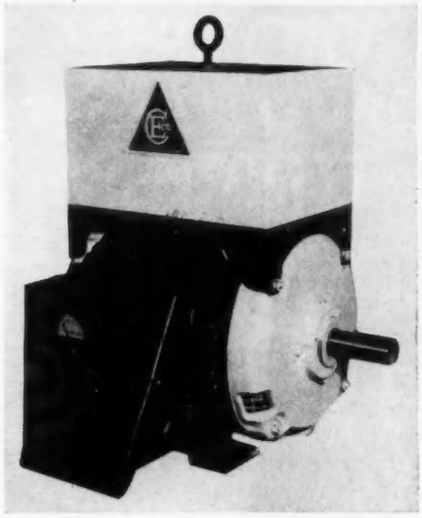
Bowen-Miller Wire Line Valve is light, compact, fast acting, high pressure valve. It uses hand pumps or hydraulic pressure to actuate vertical piston which, in turn, forces three rubber segments around wire line, forming pressure tight seal capable of withstanding up to 20,000 psi.

Circle No. 302 on Postcard, Page 287



OTHER PRODUCTS DISPLAYED:

Wire Line Blowout Preventer, Conductor Line Jar, Hydraulic Rotary Jar, Drilling Bumper Sub, Reverse Circulation Junk Basket, Internal Cutter, Wire Line Control Head, Slip-Type Rope Socket, Circulating and Releasing Overshot, Releasing and Circulating Spear, Jar Safety Joint.



range of three horsepower through 25 horsepower. Added horsepower available on special order. Features include: Three phase efficiency for single phase rates; balance meter and double shafts standard equipment; same high starting torque as in three phase motor, no adjustments to load changes necessary at or after installation.

Circle No. 304 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

A-1100-113-2S Three Engine Drilling Rig features 13800 Twin Disc Torque Converter on one engine shafter, 270VS American Blower Gyrol Fluid Coupling on another shaft, and 5150 Elmagco Electric Coupling on third shaft; B-142 Drilling Mast; RA-52-6 Traveling Block; L400 Swivel, PJ-27½ Rotary Machine; GB-250-THB Drilling Rig; Ra-30-4 Traveling Block; P-17½ Rotary Machine; Type RA Traveling Block and L-Series Swivel; Unit Pumpers; Slush Pumps.

Foster Cathead Company

Booths 12, 13, Texas Bldg.

NEW PRODUCTS DISPLAYED:

Model 59 Foster Drill Pipe Tong will put up 25,000 ft. lbs. of torque on drill pipe.

Circle No. 305 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED

Foster Power Tongs, 60 Series Single Point Adjustment Catheads.

The White Motor Company

Block 204

PRODUCTS DISPLAYED:

Oil Field Tractors, Lightweight Over-the-Road Tractor, Highway Tractor, Heavy Duty Off-Highway Oil Field Unit.

Houston Oil Field Material Co., Inc.

Booths 19-22, Texas Building

PRODUCTS DISPLAYED:

Directional drilling equipment, fishing tools, electrical well service.

Continental-Emsco Co.

Blocks 6, 7, 8

NEW PRODUCTS DISPLAYED:

Continental-Emsco T-97 Self-Supporting Mobile Drilling Mast has telescoping mast which extends 97 feet above working floor level. A positive control raising mechanism and sturdy design have eliminated need to snub lines for erection and guy wires for drilling. After mast is raised to vertical position with top section telescoped inside lower section, the top is literally raised by its own bootstraps. Using drawworks power, it is extended until four automatic pins lock sections together. Raising mast and extending top section requires six minutes. Specifications include 250,000 pound maximum static hook load capacity, 250,000 pound casing load and 134,000 pound set back capacity (7,200 feet of 4½ inch O.D. drill pipe).

Circle No. 303 on Postcard, Page 287

Continental-Emsco Green Triangle Single Phase "Convertible" Electric Motor is warranted for one year against mechanical defects or workmanship. This 1,200 rpm motor can be applied at 1,130 rpm for drive ratio purposes—advantageous in ratioing to all unit pumpers. Available in

METROL®
Metering Separators
Do Double Duty
1 SEPARATE WELL FLUIDS
2 METER THEM

METROL SAVES YOU MONEY!

Rugged and accurate (99.9%), this double duty equipment will streamline your production layout.

It eliminates (1) the need for standard separators (2) manual tank gauging and (3) the cost of individual storage tanks.

You meter while you separate and record the flow from each well . . . then use a *common* storage tank.

Model 24MS—0109C Type C Metering Separator

ALL THIS . . . AND 99.9% ACCURACY, TOO!

The accuracy of Metrol METERING SEPARATORS in the field is a proven fact. That's why they are accepted by most regulatory bodies. You'll find these units are ideally suited for metering oil for royalty and tax payments, for testing wells, for segregating produced oil and for automatic lease operation.

EXCLUSIVE PATENT (Pat. No. 2,818,738)
Long time dependability in operation . . . **plus** economy . . . is assured by these two design features (1) A patented Snap Acting Liquid Level Controller that's exclusive with Metrol and (2) positive valving sequence that absolutely prevents the slippage of unmetered liquid.

WRITE OR CALL US TODAY for technical information. Get proof of the savings possible with Metrol METERING SEPARATORS. Let us know your problems and we'll develop a specific recommendation for you **that's Metrol engineered to save you money.**

A METROL UNIT
to Meet Every Requirement
- DUMP VOLUMES ¼ bbl. to 30 bbls.
- WORKING PRESSURES 125 to 2400 psi

® Trade Mark Registered U. S. Patent Office

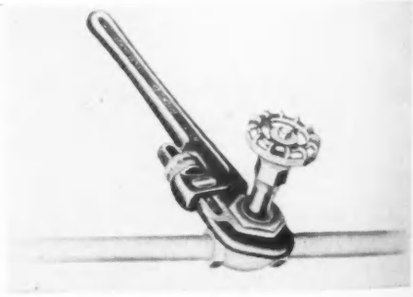
SEE YOU AT THE IPE IN TULSA MAY 14-23 Block 120 at the East Door—Hall of Science Building

OIL METERING and Processing EQUIPMENT CORP.
MELROSE 5-1226 • 4843 YALE STREET
HOUSTON 18, TEXAS

The Ridge Tool Company
Booths 28, 29, 30, 31, Texas Building
PRODUCTS DISPLAYED:

Ridgid 65R-TC Pipe Threader has new True-Centering Workholder that guarantees straight, true threads. Even if pipe is over or under size, 65R assures perfect threads, because all three workholder jaws close at one time. User pre-sets workholder cam plate to desired pipe size, which adjusts all three jaws in single action. When threader is on pipe, workholder jaws tighten as three-jaw action is continued by using forged cam lever. Easy adjustment for drip threads. Threads 1-inch to 2-inch pipe or conduit with one set of dies and permits size changes in only eight seconds.

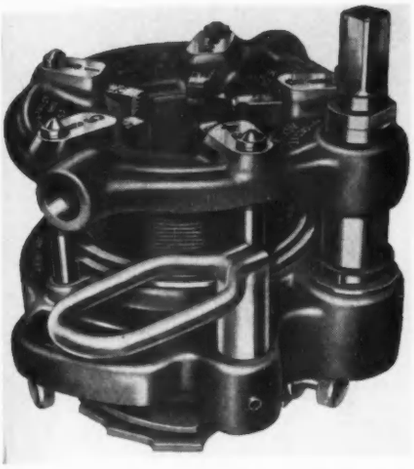
Circle No. 306 on Postcard, Page 287



Ridgid Hex Wrench has adjustable 4-sided jaw that is easy to put on or take off. Angular jaw design gives extra leverage, plus positive grip on hex nuts, square nuts, valve packing nuts, unions, and flatheads, rough or finished. Narrow jaws make work easy in tight places. Comfort-grip-I-beam handle is made of special malleable alloy, has handy hang-up hole. Available in three sizes; No. 11 for ⅜ inch to ¾ inch, No. 17 for ⅝ inch to 1¼ inch, and No. 25 for 1-inch and 2-inch nuts.

Circle No. 307 on Postcard, Page 287

Ridgid 4 PJ Geared Pipe Threader (2½ inch to 4 inch) is equipped with automatic drive kick-out that makes it jamproof. Makes threading with power drives as safe



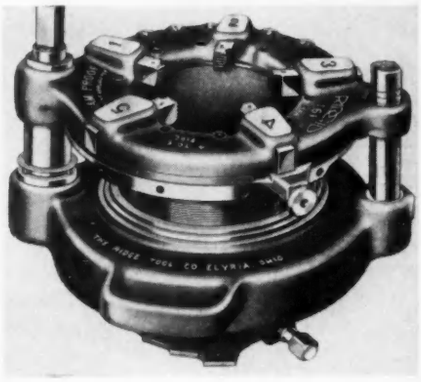
as by hand. Die stock and power drive do not have to be watched while threading. After full length thread is cut, drive pinion kicks out automatically and prevents jamming. Possibility of damage to equipment or personnel is eliminated. Gears are fully enclosed, and there are no bushings.

Circle No. 308 on Postcard, Page 287

Ridgid Top Screw Chain Vise features large, easy-to-operate chain tightening handle on top of vise base. Handle and tightening nut are anchored to base, cannot pull out. Weighing 42½ pounds, Ridgid 450 has capacity of ⅛ inch to 5 inches. No loose parts. Other features include: Complete portable workbench; folding legs with built-in tray which lock in position for work support; legs chain together for easy carrying; Tristand feet have rubber grommets to prevent creeping, and holes for bolting to floor if desired; vise base which overhangs legs for clear tool swing has tool hanger slots, rear pipe rest, three-size pipe bender, and adjustable ceiling brace screw. Available in five sizes to handle from ⅛-inch to 8-inch pipe, rod or conduit.

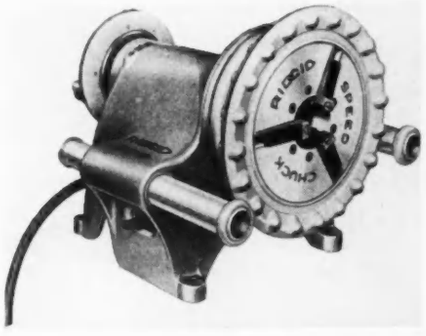
Circle No. 309 on Postcard, Page 287

Ridgid No. 161 Geared Pipe Threader (4 inch to 6 inch) is jam-proof for safe threading with power drive. Threads pipe or conduit with one set of dies that are cam activated and cannot fall out. Two spring knobs lock dies at clearly marked thread size. Easily adjusted for straight or



tapered threads, No. 161 is also fully adjustable for over and under size threads. No bushings are necessary. Plate type workholder sets to size before threader is placed on pipe. Single screw is tightened to secure workholder to pipe. Designed for power drive or hand operation, threader is equipped with ratchet handle. Other features: Closed chaser slots to keep out dirt, milled in thread wipers that prevent chip damage, large loop handles for easy, non-slip handling.

Circle No. 310 on Postcard, Page 287



Ridgid 300 Power Drive offers ⅛-inch to 2-inch capacity for pipe and conduit, will also handle ¼-inch to 2-inch bolts and rod. Motor can thread 2½-inch to 12-inch pipe when used with auxiliary drive attachments and geared tools. Features include: One-piece all metal handwheel, patented Speed Chuck, replaceable jaw inserts, heavy duty bump-proof switch for forward and reverse, two extra-strong tool support bars, Universal motor featuring armature with extra large commutator and brush capacity, fast-action cam type rear centering workholder that turns with chuck, lightweight aluminum housing with smooth, easy to clean finish. Standard equipment includes 15-foot oil resistant cord, one gallon of cutting oil, two Allen wrenches. Base has four holes for easy bench or truck bed mounting. No. 1206 folding tripod stand with tool tray available as optional equipment.

Circle No. 311 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Pipe Wrenches, Cutters, Reamers, Vises, Threaders, Cutting Oil, Power Drives, Pipe and Bolt Threading Machines.

Acme Fishing Tool Company

Booths 47, 48, California Bldg.

PRODUCTS DISPLAYED:

Alloy Steel Jars, Bits, Wire Line Sockets, Fishing Tools.

MERCOID® TEMPERATURE CONTROLS

New

EXPLOSION-PROOF

SERIES DAH-35
REMOTE STEM
TEMPERATURE CONTROLS

APPROX. WEIGHT 9¼ LBS.

OUTSIDE ADJUSTMENTS

VISIBLE CALIBRATED DIAL

VISIBLE OPERATION
You can tell at a glance whether switch circuit is on or off

SEALED MERCURY CONTACT

UL APPROVED*

SURFACE OR PANEL MOUNTING

OPERATING RANGES
13 operating ranges from -60+30°F. to 370-530°F.

Available with Breather or Drain

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Chicago 41, Illinois.

*LISTED BY

Series DAH-35
Class 1, Group C & D;
Class 2, Group E, F, G;
NEMA 7CD, 9EFG

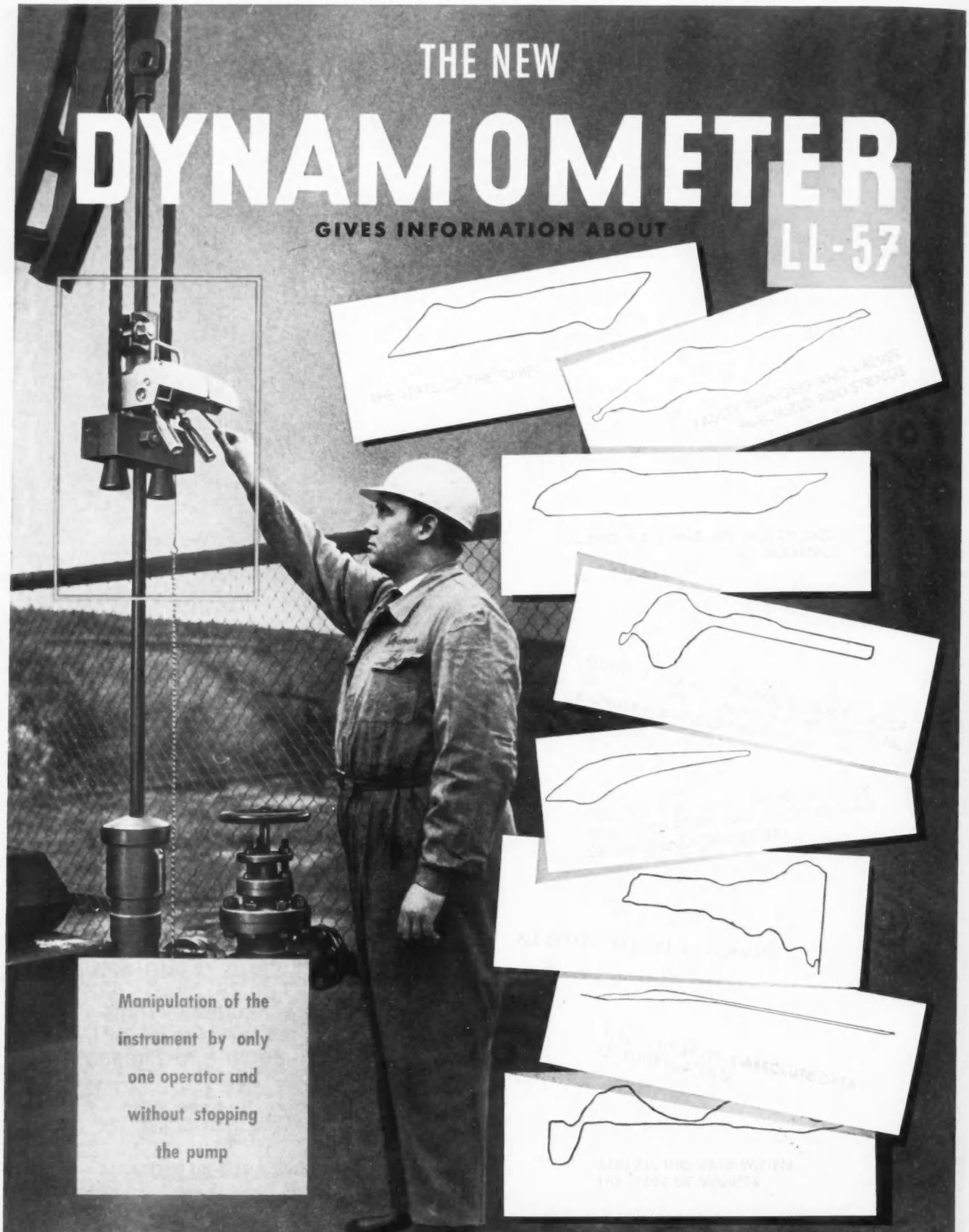
For more data on advertised products, use Readers' Service Cards, last page.

THE NEW

DYNAMOMETER

LL-57

GIVES INFORMATION ABOUT



Manipulation of the instrument by only one operator and without stopping the pump

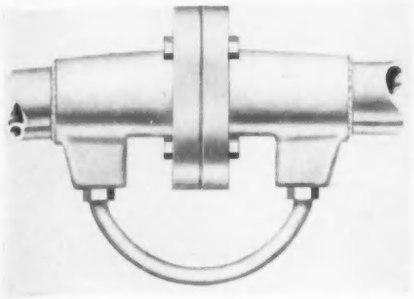
FRIEDRICH LEUTERT

LÜNEBURG-ERBSTORF·GERMANY · PHONE LÜNEBURG 3532

Aluminum Company of America

Booths 52-55, S & T Building

NEW PRODUCTS DISPLAYED:

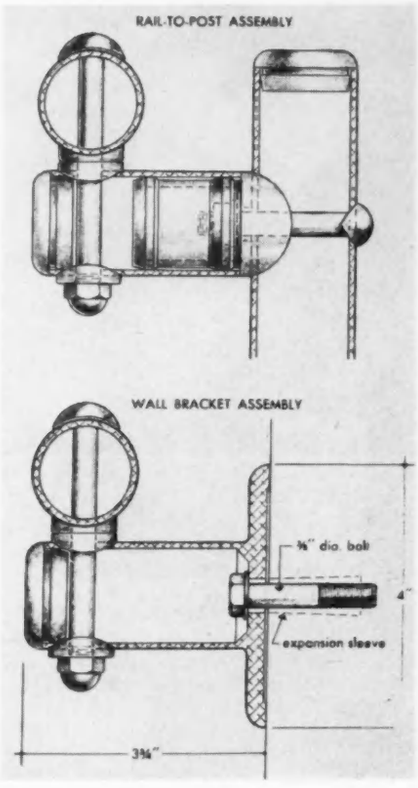


Alcoa Unitrace Extruded Aluminum Pipe (8 inch) with integral steam passage is used to transport large volumes of fuel oil, asphalt and urea. Features include: New flange, adapter flange and elbow insuring ease of installation; efficient heat transfer; high corrosion resistance. Ideal for handling material that must be moved by steam-traced piping. Also available in 1, 1½, 2, 3, 4, and 6-inch sizes.

Circle No. 312 on Postcard, Page 287

Alcoa Unistrength Pipe is seamless one-piece pipe combining thin walls with standard wall thickness at pipe ends. Welded joints are adaptable to all joining methods. By decreasing wall thickness of weldable, heat treated alloys, except at joints where heat of welding lowers strength, a 40 percent weight saving is achieved. Ratio of thick to thin walls is selected to provide uniform bursting, tension and bending strength after welding. Available in 40-foot lengths in alloys 6061-T6 and 6063-T6 with schedule 40-wall thickness at the ends, thus permitting use of standard aluminum fittings and flanges. Other wall thicknesses can be produced for various joining methods.

Circle No. 313 on Postcard, Page 287



Alcoa Aluminum Handrail System offers quick, easy field assembly. Rail to post assembly, wall bracket connection, are made of components precision machined for accurate fit. Railing will accommodate any stair angle. Specially designed mechanical fasteners and friction joints sim-

COME SEE US AT THE OIL SHOW

Our display will include working models of our latest money and man-hour saving lease automation equipment, plus many other Enardo specialty items which have become standards in the industry.

- **Vapor Control**
- **Pipe Line**
- **Tank Equipment**
- **High & Low Pressure Motor Valves**
- **Meter Vessel Control Kits**
- **Float Controls**
- **New Vari-trol Pilot, Non-Bleed**
- **High & Low Pressure Well Head Controls**
- **Four-Way Manifold Valve**
- **Tank Level Control—Automatic**
- **Manifold Tees**

Our booths are just inside the west main door of the Oklahoma Building.

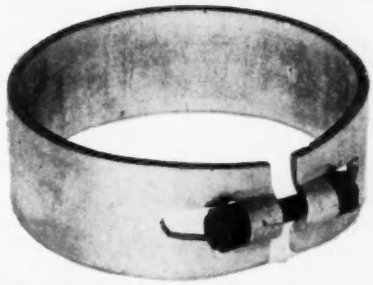
Enardo *Manufacturing Company* BOX 1647 TULSA

DON'T WELD ON CASING!

B and W

FRICTION-LOCK CLAMPS

give you these distinct advantages in mounting scratchers and centralizers:



LOWER COST . . . Friction-Lock Clamps cost less than welding when ordered with B and W Scratchers and Centralizers.

WITHSTANDS GREATER THRUST . . . exhaustive laboratory tests prove Friction-Lock Clamps withstand resistance to vertical movement far in excess of average field welding.

ELIMINATES WELDING DAMAGE . . . average field welding may damage casing from undercutting, hard spots and electrolytic corrosion . . . Friction-Lock Clamps cannot damage casing.

ONLY FULL GRIPPING DEVICE . . . only the Friction-Lock Clamp grips uniformly around the complete periphery of the casing . . . other holding devices grip over relatively small areas.

EASIER INSTALLATION . . . B and W Friction-Lock Clamps may be installed in seconds with a simple hex wrench.

ANOTHER FIRST BY THE FIRST NAME IN PRIMARY CEMENTING TOOLS

OTHER B and W PRODUCTS:

Multi-Flex Scratchers • Nu-Coil Scratchers • Rotating Scratchers, Multi-Flex and Nu-Coil Types • Automatic Stop Collars • Stabilizers • Rotator Collars • Liner Centralizers • Latch-On and Solid Type Centralizers • Thread-Lock Cages • Thread-Lock Cement.

B and W Inc.

Well Completion Specialists

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Box 5266
Houston 12, Texas
PHONE WAlnut 3-6603

WEST COAST
19706 South Normandie Ave.
Torrance, California
PHONE FAculty 1-2463

For more data on advertised products, use Readers' Service Cards, last page.

HYCALOG DIAMOND CORE BITS

WIRE LINE CORING RECOVERS MORE CORE... FASTER IN GULF AREA

High penetration rates were maintained on these seven wells... *with Hycalog diamond wire line coring bits*... and drill strings didn't have to be pulled for bit changes until coring was completed. Located in Webb, Matagorda, and Orange Counties, Texas, and St. Charles Parish, Louisiana, they are typical of coring jobs throughout the Gulf area.

SIZE BIT	NO. CORES CUT	FEET CUT	% RECOVERY	AVERAGE FT./HR.
7⅝ x 1¾	10	129	100.	7.15
7⅝ x 1¾	12	130	97.	8.25
6¾ x 1¾	5	62	99.9	4.65
7⅝ x 1¾	17	155	80.	5.24
7⅝ x 1¾	37	465	95.5	4.2
7⅝ x 1¾	32	463	87.	6.9

Why not let Hycalog diamond core bits set a record on your next coring program? *And ask us about Hycalog* GAS CHRONO-FRAC *well logging services.*

Hycalog, Inc.
505 AERO DRIVE
SHREVEPORT, LOUISIANA

BRANCH OFFICES IN PRINCIPAL OIL PRODUCING AREAS

DIAMOND BITS DIAMOND CORING
WELL LOGGING CORE ANALYSIS

---

plify installation. Bolt anchorage to walls and floors is concealed, and pipe threading or welding is not required.

Circle No. 314 on Postcard, Page 287

Alcoa Aluminum Stair Tread is designed for use where stairs are subject to extreme weathering or corrosive atmospheres. Die-cast tread utilizes slip-proof abrasive nosing. Has high corrosion resistance and strength. Precision cast one-piece grating distributes loads evenly to all bearing bars;

has withstood loads in excess of 3,000 pounds.

Circle No. 315 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

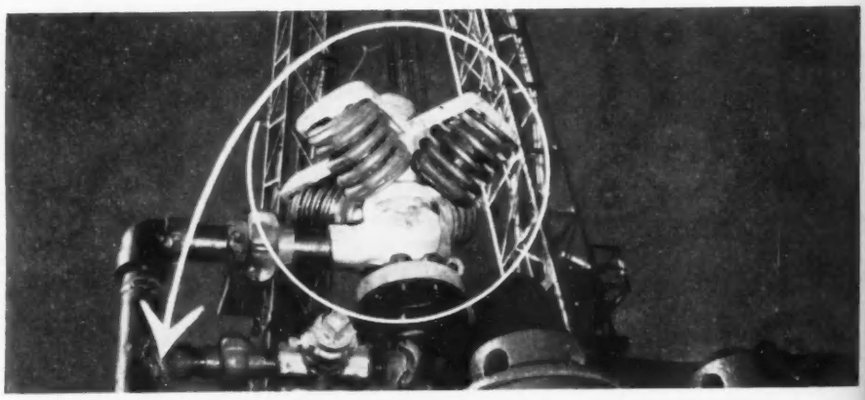
Drilling Rig Supply Pipe and Fittings; Heat Exchanger Tubes; Chain Link Fence; Roofing and Siding; Building Panels; Castings and Forgings; Aluminum Chemicals.

W. H. Curtin & Company

Booths 79, 80, S. and T. Bldg.

PRODUCTS DISPLAYED:

Hydrometer Carrying Case, Curtin Centrifuge, Paleontological Sample Washer, Tank Thermometers.



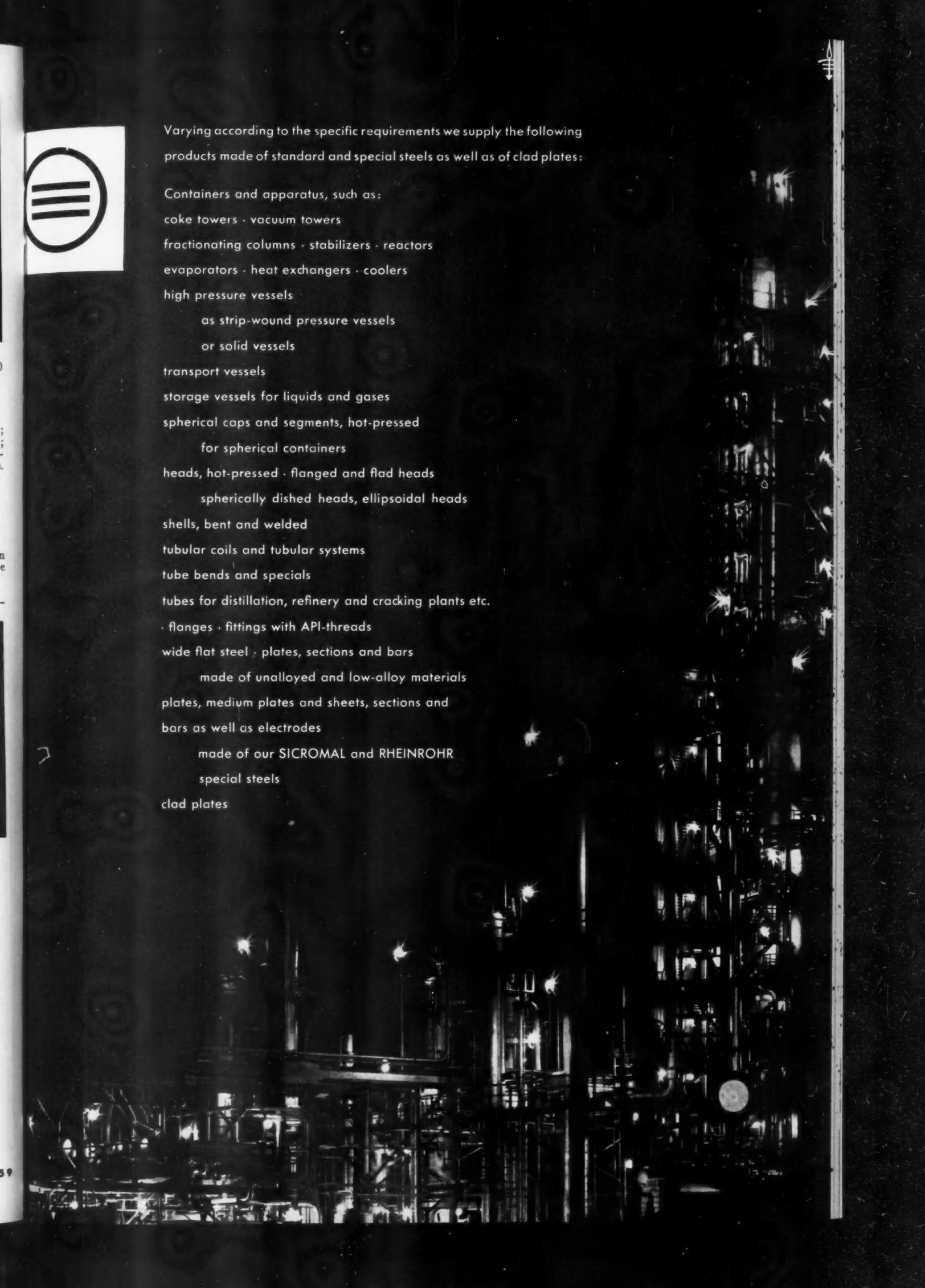
KINZBACH... Sensitive, Positive, Easily Adjusted Pressure Relief Protection

Operate rig circulation systems for maximum effectiveness — in complete safety — with Kinzbach Model 112 Mud Pump Relief Valves installed. You are assured instantaneous relief at set pressure with quick, automatic reset to maintain flow and pressure in partially blocked systems. When system is completely blocked, Kinzbach Pressure Relief Valves give full bypass for safety to pumps and other equipment.

Kinzbach Model 112 Pressure Relief Valve pressure range from 500 psi to 16,500 psi safely meets all drilling requirements including cementing and fracturing jobs. Available in 2" and 3" sizes. Write for complete catalog or see your Composite Catalog.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.
P. O. Box 277 • HOUSTON, TEXAS
EXPORT: 74 TRINITY PLACE, NEW YORK, N. Y.



Varying according to the specific requirements we supply the following products made of standard and special steels as well as of clad plates:

Containers and apparatus, such as:
coke towers · vacuum towers
fractionating columns · stabilizers · reactors
evaporators · heat exchangers · coolers
high pressure vessels
as strip-wound pressure vessels
or solid vessels
transport vessels
storage vessels for liquids and gases
spherical caps and segments, hot-pressed
for spherical containers
heads, hot-pressed · flanged and flad heads
spherically dished heads, ellipsoidal heads
shells, bent and welded
tubular coils and tubular systems
tube bends and specials
tubes for distillation, refinery and cracking plants etc.
· flanges · fittings with API-threads
wide flat steel · plates, sections and bars
made of unalloyed and low-alloy materials
plates, medium plates and sheets, sections and
bars as well as electrodes
made of our SICROMAL and RHEINROHR
special steels
clad plates

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More Magnetic Fishing Jobs Successfully Completed With K & G Tools and Methods than with all other magnetic tools combined...

for satisfaction use

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MAGNETIC FISHING TOOLS
DRILL PIPE JUNK SHOT
ADJUSTABLE CORE BARREL MAGNET

Available in popular sizes from most major fishing tool companies. Be sure to see that it's K & G . . . the only company licensed to manufacture under U. S. Patent No. 2,668,077.

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OIL TOOL and SERVICE COMPANY, Inc.

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JA 2-5436

7345

The S. M. Jones Company

Booths 15, 16, Oklahoma Building

PRODUCTS DISPLAYED:

Sucker Rods, Pony Rods, Couplings, Sub Couplings.

Phillips Petroleum Company

Booths 106, 107, Texas Building

PRODUCTS DISPLAYED:

Rubber Chemicals, Carbon Black, Hydrochemicals, Special Chemicals, Atomic Energy, Uranium Mining and Milling, Natural Gas Liquids, Refined Petroleum Products, Nitrogen Fertilizer, Process Licensing, Patents, Technical Assistance, Plastics.

U. S. Borax & Chemical Corp.

Booth 213, Oklahoma Building

PRODUCTS DISPLAYED:

Ureabor; Polybor-Chlorate and Concentrated Borascu; Weed Killing Products; Boraxo Powdered Hand Soap; Borax Special Heavy Duty Powdered Hand Soap; Luron with Lanolin; Borax Dispensers; Luron Dispeners.

Graver Tank & Mfg. Company Division-Union Tank Car Co.

Booths 74, 75, Kansas Bldg.

PRODUCTS DISPLAYED:

Pictorial sequences of general line.

Oakite Products, Inc.

Booths 22, 23, Texas Building

PRODUCTS DISPLAYED:

Oakite Composition No. 77; Oakite Compounds No. 185, 85, 32; Oakite Solution Lifting Steam Gun.

Ampco Metal, Inc.

Booths 32, 33, 34, California Building

PRODUCTS DISPLAYED:

Aluminum Bronze Pipe (seamless and welded); Fittings; Fluid Ends used in oil field salt water; Centrifugal Pumps for corrosive liquids and slurries; spark-resistant, corrosion-resistant Safety Tools; Aluminum Bronze Welding Electrodes; Wire.

Parker Seal Company, Division of Parker-Hannifin Corporation

Booth 16N, North Area

PRODUCTS DISPLAYED:

Gask-O-Seals for pipe flange connections; Synthetic Rubber O-Rings for general sealing applications.

Aldrich Pump Company

Booths 30, 31, California Building

PRODUCTS DISPLAYED:

2⅞ inch by 5 inch Septuplex Plunger Pump with all aluminum bronze fluid end and 2⅝ inch by 3 inch Triplex Pump with sectionalized Lucite fluid end.

Oil Tool Mfg. Co.

Booth 154, Oklahoma Building

NEW PRODUCTS DISPLAYED:

Type WBS Rock Bit is designed to drill extremely hard formations such as chert, quartzite, granite and pyrite. Cones are offset 2 degrees from apex to create chipping action on entire hole bottom at all times. Weights of 4,000-6,000 pounds per square inch of bit diameter can be applied with safety at rotary speeds of 35 rpm or less. Also used in percussion down-the-hole hammer drilling. Bearings are fit to withstand any kind of shock without breakage. Available in sizes 5⅝, 6, 6¼, 6¾, 7⅞ inches.

Circle No. 316 on Postcard, Page 287

Le Roi Division Westinghouse Air Brake Co.

Block R, Le Roi Building

PRODUCTS DISPLAYED:

1BYC Stationary Air Compressor, 5YC Stationary Air Compressor, Portable Rotary Air Compressor.

Industrial Products Division, Westinghouse Air Brake Co.

Block R, Oklahoma Drive

PRODUCTS DISPLAYED:

Automatic Engine Control, Desurger, Flexair Valve, Air Circuitry Components.

Diamond Chain Company, Inc.

Booths 11, 12, S. and T. Bldg.

PRODUCTS DISPLAYED:

Roller Chains, Sprockets and Couplings for power transmission.

Walworth Company

Booths 103-108, Okla. Building

PRODUCTS DISPLAYED:

Valves made of bronze, iron, steel, special Alloys, pvc (plastic); Lubricated Plug Valves (10 inch with unitized gearing); Ductile Iron Valves.

Like Roaring Niagara...

there's more to Cities Service than meets the eye!

Viewed by more than 2,000,000 visitors each year, awesome Niagara Falls is more than a scenic place to honeymoon or test your skill with a camera.

Niagara's thundering waters also provide the low-cost, hydro-electric power that has given birth to one of the greatest industrial areas in the world.

In a sense, oil company operations are like that. Millions of people, for example, quickly recognize the Cities Service emblem and the 19,000 stations this emblem identifies. Few, however, ever see its drilling rigs at work, probing four continents for oil . . . and no one ever sees its thousands of miles of pipelines.

These, however, are only part of the modern facilities in which Cities Service has already invested a billion dollars. Caring for tomorrow's even greater needs will require further investment. Thus, just in the last two years, Cities Service spent over $350 million building for the future.

Only in this way can America be given what she must have for progress —more jobs, more and better petroleum products.

Through the low-cost, hydro-electric power created by Niagara's thundering waters, has grown one of the world's leading industrial regions. Niagara also keeps a closely guarded secret – its age. Geologists would like to know, but Lady Niagara isn't talking.

CITIES SERVICE

OIL'S FIRST CENTURY
BORN IN FREEDOM
WORKING FOR PROGRESS

Penberthy Manufacturing Co., Division of Buffalo-Eclipse Corp.

Booths 13N, 14N, North Area

PRODUCTS DISPLAYED:

Gages, Valves, Jet Pumps, Ejectors, Injectors, Water Heaters, Electric and Explosion Proof Sump Pumps.

V. D. Anderson Co. Division, International Basic Economy Corp.

Booths 47, 48, S. and T. Bldg.

PRODUCTS DISPLAYED:

Demonstration Type L-4 Anderson Hi-eF Horizontal Line Purifier, Demonstration Type LGV-4 Anderson Hi-eF Vertical Line Purifier, Standard Type LBV-2-600 Anderson Hi-eF Vertical Line Purifier; Demonstration Steam and Float Traps and Accessories.

Republic Steel Corporation

Booths 102-115, Kansas Building

PRODUCTS DISPLAYED:

Oil Country Casing and Tubing; Electric Resistance Weld and Fusion Weld Line Pipe; Continuous Butt Weld Pipe; Republic X-Tru-Coat Plastic-Coated Steel Pipe and Tubing, and Plastic Pipe; Electrical Products; Structural Tubing and Grooved Lightweight Tubing; Republic Alloy and Stainless Steels; Shelving; Lockers; Containers; Material Handling Equipment; Fasteners.

Marine Products Company

Booths 61, 62, 63, North Area

NEW PRODUCTS DISPLAYED:

Flomax Engine-Driven, Self-Priming Centrifugal Pumps are also available as "pump-ends." Pump can be separate unit, removable from its engine, and transferred to newer or larger engine. Or, cast iron pump-end can be replaced by one of aluminum or bronze to suit weight limitations or to withstand corrosive conditions. Ratings of Flomax series range from 140 to 380 barrels an hour.

Circle No. 317 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Duraflex 6600 Rotary Pump; Straight Centrifugal Pumps.

Mine Safety Appliances Co.

Booths 48, 49, Okla. Building

PRODUCTS DISPLAYED:

MSA Lamb Air Mover, Safety Equipment, Aluminum T Hats and Caps; Lira as applied to well logging; Combustible Gas Indicators and Detectors.

Thompson Tool Company

Block 207, North Area

PRODUCTS DISPLAYED:

Rotating Type Shale Separator with sample machine attached, Vibrating Type Shale Shaker with sample machine attached.

Rust-Oleum Corporation

Booth 129, Kansas Building

PRODUCTS DISPLAYED:

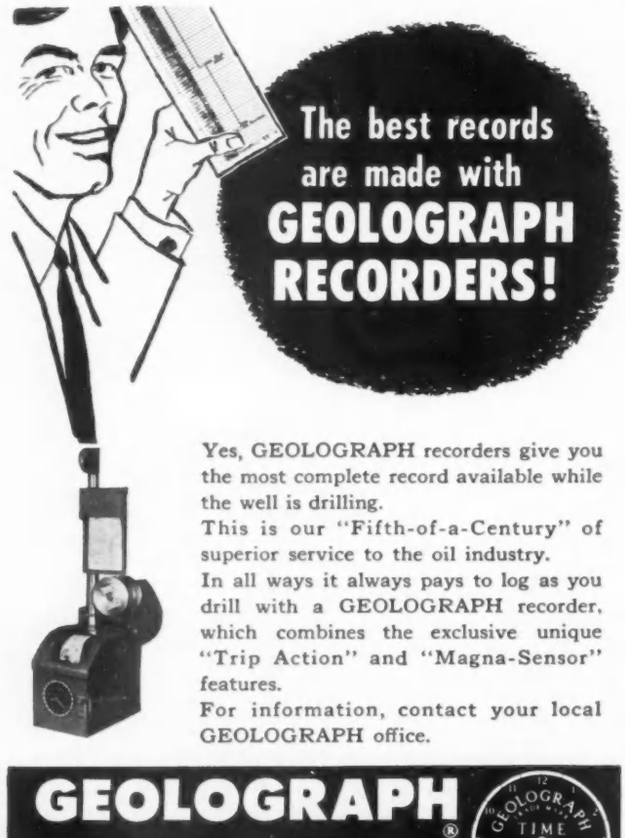
Rust-Oleum Rust Preventives, Galvinoleum (used on galvanized metal surfaces), Surfa-Etch (used in cleaning oily, dirty concrete floors), Rust-Oleum Heavy Duty Chemical Resistant Coatings.

Macwhyte Wire Rope Co.

Booths 130, 131, Okla. Building

PRODUCTS DISPLAYED:

Internally Lubricated Rotary Drilling Line, Stainless Steel Rope, Monel Metal Rope, Plastic and Nylon Coated Rope, Cable-Laid and Braided Wire Rope Slings.



The best records are made with GEOLOGRAPH RECORDERS!

Yes, GEOLOGRAPH recorders give you the most complete record available while the well is drilling.

This is our "Fifth-of-a-Century" of superior service to the oil industry.

In all ways it always pays to log as you drill with a GEOLOGRAPH recorder, which combines the exclusive unique "Trip Action" and "Magna-Sensor" features.

For information, contact your local GEOLOGRAPH office.

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OIL FIELD SERVICES

P. O. Box 1276 • Oklahoma City 1, Okla.

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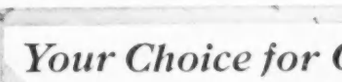
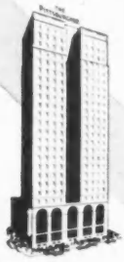


HOTEL PITTSBURGHER

Right in the heart of the Golden Triangle 400 outside rooms with TV and every comfort of modern hotel design. General Forbes Lounge and Dining Room . . . Air Conditioning. Airport Limousine and Taxi Service.

Forbes Avenue Below Grant

ATlantic 1-6970



JACKTOWN MOTOR HOTEL

The very finest accommodations. 60 air-conditioned rooms with TV, telephone, combination tile baths. Excellent dining room. Facilities for group parties 15 to 500.

Route 30 Irwin, Pa.

1 mile West of Irwin Interchange

UNderhill 3-2100

KNOTT HOTELS

Joseph F. Duddy, Gen. Mgr.

HOTEL PITTSBURGHER MOTEL

Opposite Greater Pittsburgh Airport on beautiful Airport Parkway West. 56 luxurious, air-conditioned rooms with tile bath, TV, private phone. Courtesy car to and from airport.

AMherst 4-5152

★ Teletype Service. For immediate confirmation of reservations at no charge . . . telephone any Knott Hotel—or teletype PG-29.

Well Equipment Mfg. Corp.

Booths 101, 102, 103, 108, 109, 110
Texas Building

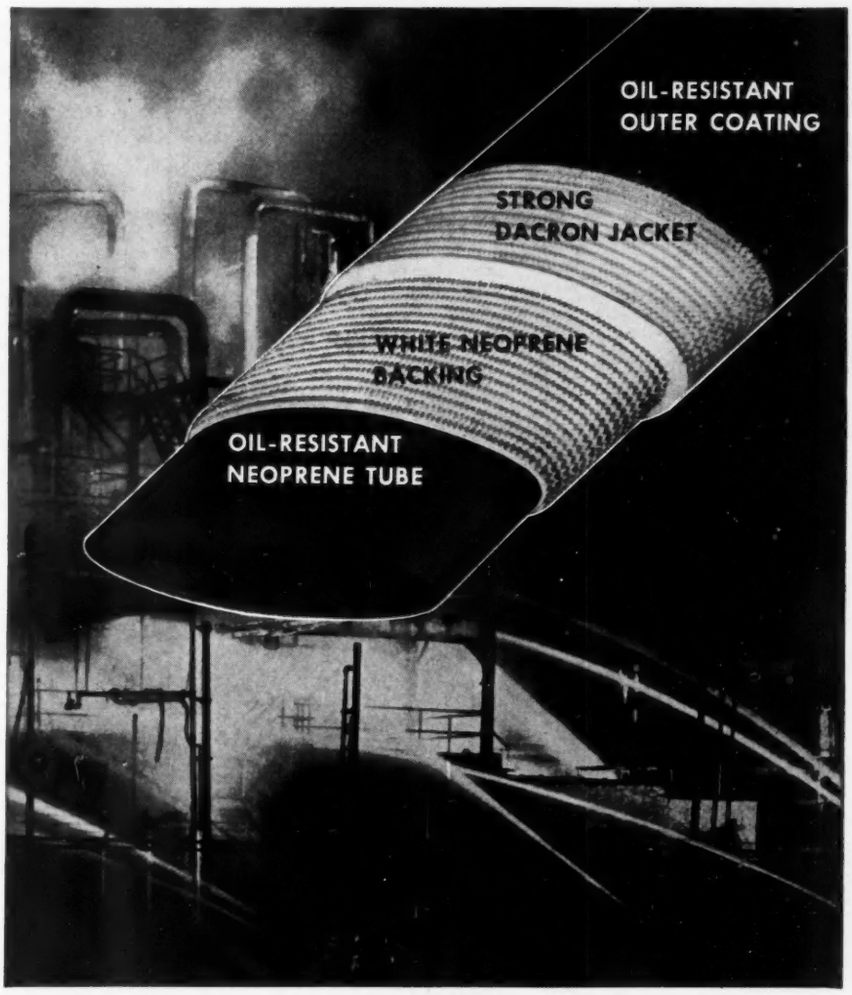
NEW PRODUCTS DISPLAYED:

WECO Air-O-Union consists of two parts, inflatable tube and union body. Tube is fitted into recessed section of body, so when pipe is placed in body the connection is sealed by air pressure in tube. To break out connection, tube is deflated. The body is welded in place on tanks or lines. Air-O-Unions are used on mud suction and return lines, low pressure fluid lines. They are made up easily and quickly without close line-up, allow for mis-alignment or pipe expansion without breaking seal. They require no bolts, nuts or wrenches to make-up or break-out. Sizes range from 6 inches through 16 inches.

Circle No. 318 on Postcard, Page 287

WECO Insulated Union provides more than 35 million ohms resistance across the union. Special laminated rings on each side of lug on male sub are locked in place to assure exact placement and prevent loss. Rings provide maximum insulation between both subs and wing nut. An "O" ring on male sub and special resilient seal ring in female sub maintain same sealing effectiveness present in all WECO Unions. An extra resilient ring is used on O.D. of male sub to seal gap

YEARS OF CHEMICAL EXPOSURE CAN'T KNOCK OUT THIS PETROCHEM FIRE HOSE



Strong, lightweight, extremely flexible, and easily folded, "Quaker" PETROCHEM is ideal for fire-protection where acids, alkalies, and hydrocarbons ruin ordinary hose.

Many large chemical plants (typical case histories on request) report PETROCHEM hose still going strong after as long as *four years'* constant exposure to sulfur, chlorine, solvents, etc., where hose previously had to be replaced two or three times a year.

Neoprene inner tube and neoprene-impregnated "Dacron" jacket give PETROCHEM maximum corrosion-resistance. *And PETROCHEM is the only all-synthetic fire hose with UL approval.*

Ask the Thermoid industrial distributor about PETROCHEM "White" and PETROCHEM "Black" fire hose to meet the severest requirements of the oil and chemical industries. Or write *Thermoid Division, H. K. Porter Company, Inc., Tacony & Comly Sts., Philadelphia 24, Pa.*

THERMOID PORTER DIVISION

H.K. PORTER COMPANY, INC.

Divisions: Connors Steel, Delta-Star Electric, Disston, Forge and Fittings, Leschen Wire Rope, Mouldings, National Electric, Refractories, Riverside-Alloy Metal, Thermoid, Vulcan-Kidd Steel, H. K. Porter Company (Canada) Ltd.

See us at Tulsa

MAY 14-23

International Petroleum Exposition

Block 205

PAXMAN

.....where we are featuring the **NEW** Paxman

VEGA air-cooled 310 b.h.p. power pack;

— a Paxman standard 143 kW Oilfield Generating Set;

— and a Paxman standard 618 b.h.p. Oilfield Engine

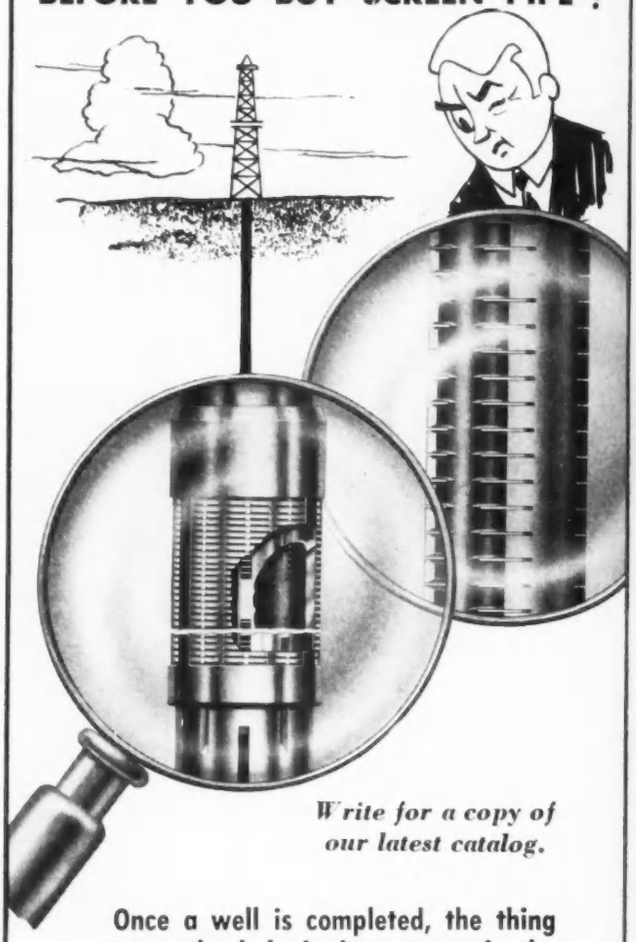
DAVEY, PAXMAN & CO LTD · COLCHESTER · ENGLAND

a member of the RUSTON *Group.*

J.57

Take A Good Look...

BEFORE YOU BUY SCREEN PIPE !



Write for a copy of our latest catalog.

Once a well is completed, the thing next to the hole in importance is the selection of the best Screen Pipe available. Here are the facts about EMSCO Screen Pipe.

EMSCO Wire Wrapped Screen with vertical slots provides 50% to 60% more opening per foot than conventionally drilled holes. It retains more tensile strength than drilled pipe.

EMSCO Slotted Screen Pipe retains up to 85% of the original collapsing strength of the pipe. It is smooth, facilitating setting and pulling. It can be reasonably spudded or rotated without fear of damage. Internal "V" slots promote drainage, retard clogging.

EMSCO SCREEN PIPE COMPANY

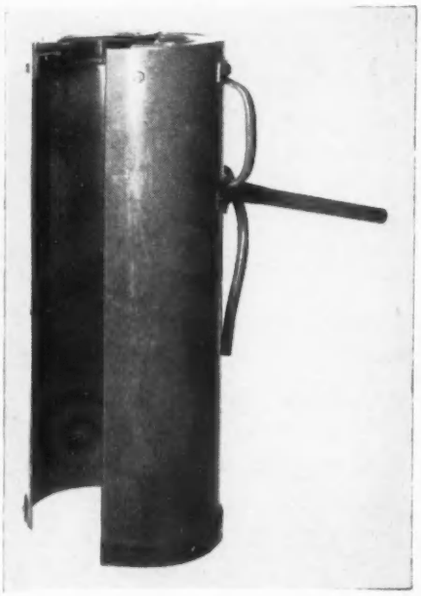
P. O. Box 14446 • Phone JA 6-2609

3 Ricks Rd. • Houston 21, Texas

EXPORT REPRESENTATIVE: Val R. Wittich, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

between sub and nut to prevent accumulation of moisture, condensation, etc., in critical installations.

Circle No. 319 on Postcard, Page 287



WECO Tubing Wet Box is light-weight, easily handled box which clamps around tubing joint to prevent fluid spraying over work area when pulling tubing. It is fully opened and tightly closed by a single operating lever. Synthetic rubber seal in top of box prevents splashing out of the top. One box can be used for all sizes of tubing simply by changing rubber seal.

Circle No. 320 on Postcard, Page 287

WECO Cleanout Gate can be installed on inside or outside of any type tank, round, rectangular, wood or steel. A gate holding frame is welded or bolted to tank and sealed with Neoprene gasket. Synthetic rubber ring vulcanized to the frame seals gate and frame opening. Gate is operated by steel handle extending to top of tank. Cam on the handle forces gate into sealed position when closed. A lug holds gate in open position when desired. Handle is equipped with link jars to free gate if stuck after long periods of being closed. Gates are available in two sizes: Large with 115 square inch opening, and small with 49 square inch opening.

Circle No. 321 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

Wing Unions, Tool Joint Compound, Thread Compound, Snatch Blocks and Tubing Blocks, Mis-Aligning Unions, Flat Face Union.

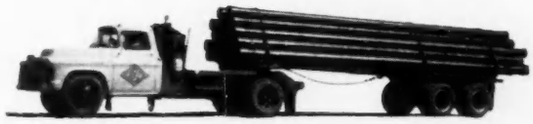
Congrats and $25 to Billy D. Brown, T.P. Coal & Oil Co., P. O. Box 4067, Midland, Texas

Since the petroleum industry made its lusty entrance with the Drake well a century ago . . some remarkable records of achievement have been chalked up by oil and gas men.

Lone Star Steel represents one of the great forward steps, and a real convenience for Joe Roughneck . . because Lone Star fine API pipe is made and delivered daily in the heart of the oil country.

Lone Star is a round-the-clock quality operation. You can depend upon Lone Star API casing, tubing and line pipe.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.



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Lone Star STEEL COMPANY

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DISTRICT SALES OFFICES
912 Republic National Bank Building, Dallas, Texas
Houston, Texas | Midland, Texas | Tulsa, Oklahoma

GRAY

Complete Well Control For Complete Safety

Gray Well Head Assemblies are designed, engineered and constructed to give you complete control of your well.

The result is complete safety from the casing head to the pressure gauge.

Design simplicity eliminates unnecessary weight, puts the metal at points of stress. Engineering provides maximum flexibility in positive, efficient handling of single or multiple zones in high, medium or low pressures at any depths.

That's why Gray Systems of Well Control give you *more strength with less weight . . . complete control with complete safety.*

For more information about Gray's Systems of Well Control, see the Gray Catalog in Composite Catalog or write

GRAY *Tool Company*

P. O. BOX 2291 HOUSTON, TEXAS
REpublic 4-1641

MAIL THIS COUPON TODAY

GRAY TOOL COMPANY
P. O. Box 2291 Houston, Texas

Please send me full details of the Gray Systems of Well Control.

Name_____

Company_____

Title_____

Address_____

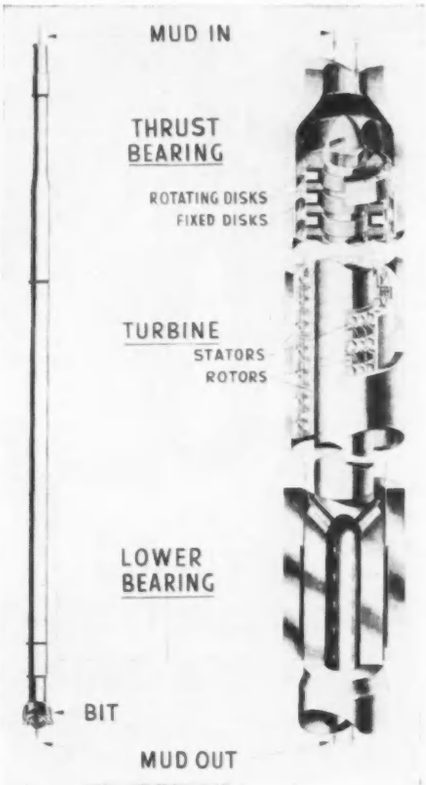
City_____ State_____

5902

Turbodrill Division Dresser Industries, Inc.

Dresser Building, Silver Lane

NEW PRODUCTS DISPLAYED:



Dresser Turbodrill is a downhole hydraulic turbine, operated by circulation of drilling fluid stream. Turbine consists of from 80 to 240 stages, depending on size, of alternating rotors and stators. Turbodrill converts power generated by mud pumps at surface into hydraulic power for driving drill bit at bottom of hole, thus obviating necessity of rotating the drilling pipe. Sizes range from 5 inch O.D. to 10½ inch O.D.

Circle No. 322 on Postcard, Page 287

Dresser Industries, Inc.

Dresser Building, Silver Lane

PRODUCTS DISPLAYED:

IDECO Drilling Rig and Auxiliary Equipment; Security Rock Bits; Hole Openers; Reamers and Stabilizers; Magcobar Muds and Additives; Lane Wells Perforating, Logging, Cementing, and Completion Equipment; Turbodrills; SIE Seismic Equipment; Guiberson Oil Tools; Clark Compressor Models; Roots Blowers; Pacific Pumps; SIE Automatic Custody Transfer Systems; Flowmeters.

Viking Pump Company

Booth 57, California Bldg.

PRODUCTS DISPLAYED:

Heavy-Duty Rotary Pumps.

Ladish Company

Booths 7, 8, 9, Kansas Bldg.

PRODUCTS DISPLAYED:

Welding Pipe Fittings; Screwed Pipe Fittings; Socket Type Pipe Fittings; Clamp Type Fittings; Unions; Stainless and Alloy Valves; Stainless and Alloy Pipe Fittings; Multiple Outlet Fittings.

Southwestern Industrial Electronics

Block 11

PRODUCTS DISPLAYED:

Seismic Instruments; Electronic Instruments; Flow Meters.

Roots-Connersville Blower

Block 11

PRODUCTS DISPLAYED:

Blowers; Vacuum Pumps.

REN Equipment Co., Inc.

Booths 31-33, Park Lane

PRODUCTS DISPLAYED:

REN Oil Level Regulators; REN Exhaust Condensers; REN Lubricating Oil Flow Meters.

Piper Aircraft Corporation

Block 117

PRODUCTS DISPLAYED:

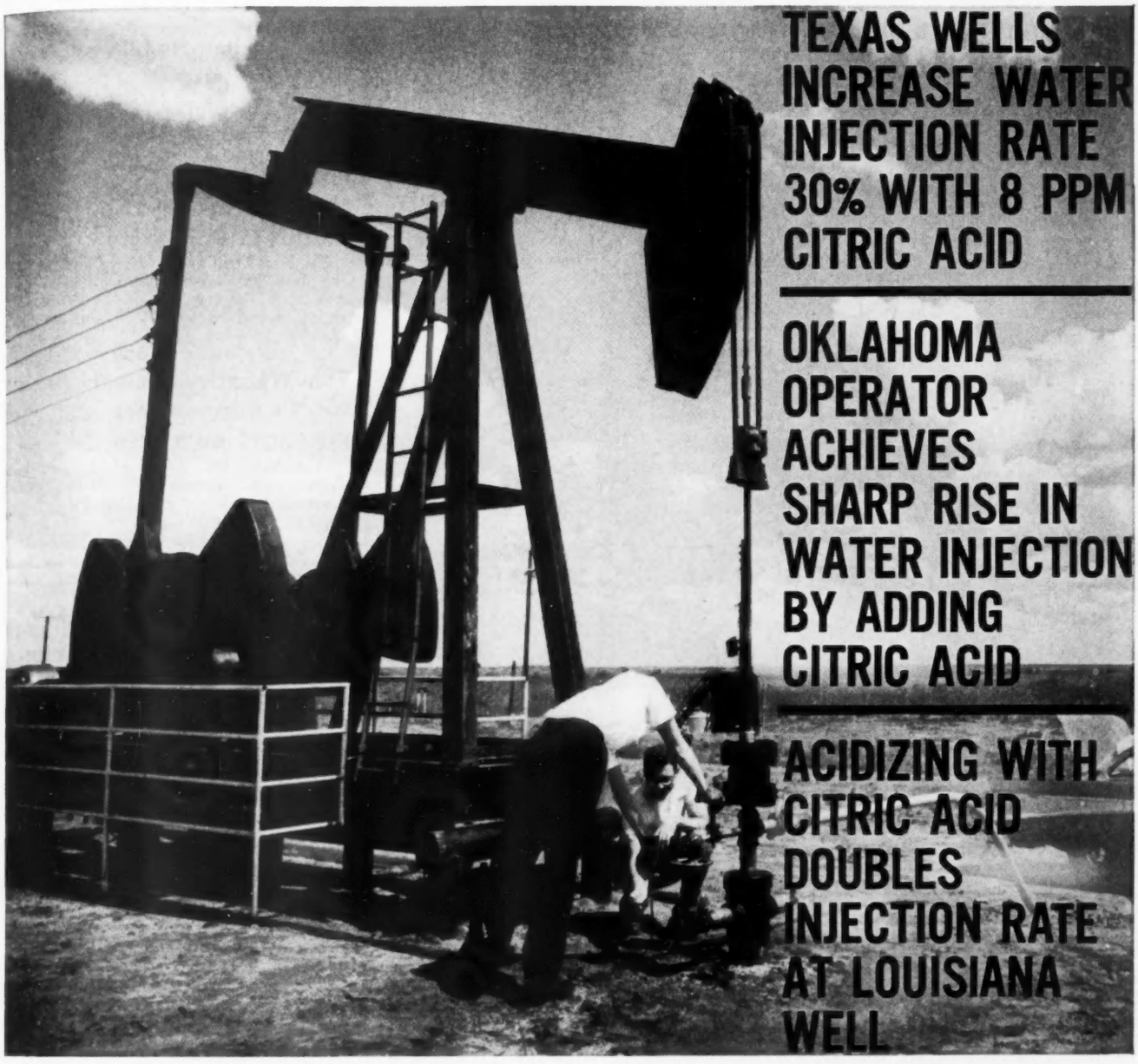
Piper Aztec; Piper Apache; Piper Comanche; Piper Tri-Pacer.

PERFORATE TUBING IN THE WELL

KINLEY TUBING PERFORATOR

M. M. Kinley Company Licensees

ABILENE, TEXAS—Hudson-Eads, Inc....OR 2-5331
ANACO, ANZOATEGUI, VENEZUELA
Anzoategui Wire-Line Service, C. A.
BAY CITY, TEXAS—J. P. Graham.....CI 5-4526
BEAUMONT, TEXAS
Assoc. Eng. & Eqpt., Inc.....TE 5-7046, ZF 8-2023
CABIMAS, ZULIA, VENEZUELA
Wireline Engineers, S. A.
CASPER, WYOMING—C. A. White.....3-5264
CORPUS CHRISTI, TEXAS—Tolle, Inc...TE 5-5367
FARMINGTON, NEW MEXICO
B & R Service, Inc.....DA 5-2393
FORT MORGAN, COLORADO—C. A. White....919
GLENDIVE, MONTANA—C. A. White...EM 5-3833
HOBBS, NEW MEXICO
Horne Well Service Co.....3-5396
HOUMA, LOUISIANA—Cameo, Inc.....7330
HOUSTON, TEXAS
Assoc. Eng. & Eqpt., Inc.....CA 5-1103
HOUSTON, TEXAS
Mid-Western Well Ser. Co.....RE 4-4262
HOUSTON, TEXAS
Long Line Production Co.....GR 3-5739
LAFAYETTE, LOUISIANA
Assoc. Eng. & Eqpt., Inc.....CE 5-6770
Cameo, Inc.....CE 5-3124
LIBERAL, KANSAS—Rainbo Service...Main 4-3598
MIDLAND, TEXAS
Luccous Service & Eqpt. Co.....MU 2-1631
HOUMA, LOUISIANA
Assoc. Eng. & Equip. Inc.....UP 2-0347
ODESSA, TEXAS
Cameo Wire Line Service, Inc.....FE 2-6497
OKLAHOMA CITY, OKLAHOMA
Rainbo Service Co.....ME 4-2131, ME 4-0105
PETTUS, TEXAS
Eddie Jones Eng. Co., Pettus 16, Beeville, FL 8-1218
SHREVEPORT, LOUISIANA—Cameo, Inc....8-3615
VICTORIA, TEXAS—Cameo, Inc.....HI 3-9521
WHITTIER, CALIFORNIA
Kline Wire Line Co.....OX 3-2731
WICHITA FALLS, TEXAS—Hudson-Eads, Inc.
322-8584, 322-1792, 767-8727, 723-4690, 767-3793



TEXAS WELLS INCREASE WATER INJECTION RATE 30% WITH 8 PPM CITRIC ACID

OKLAHOMA OPERATOR ACHIEVES SHARP RISE IN WATER INJECTION BY ADDING CITRIC ACID

ACIDIZING WITH CITRIC ACID DOUBLES INJECTION RATE AT LOUISIANA WELL

• Citric acid is making news at water injection operations all over the country. Extensive tests carried out at well heads have proven this fact: citric acid can prevent plugging that is caused by iron precipitates in injection water.

At two salt water disposal wells in Southern Texas, with average injection rates of 200 to 400 barrels per day, maintenance treatment with an 8 ppm addition of citric was started. In a short time, a 30% increase in flow rates was noted.

A well in Oklahoma was experiencing lowered injection rates because of iron plugged sandface. The well was acidized with a solution of 260 pounds of citric acid, 25 gallons of Triton* X-100, 250 gallons of 15% HCl and 500 gallons of water. This treatment dissolved and sequestered iron responsible for plugging. Injection rate rose from 50 bbl water per day to 400 bbl per day at considerably reduced pressures.

A water flood operation in Southern Louisiana had such a concentration of iron precipitates that they could not, economically, be kept in solution. Two wells were treated with two 400 pound batches of citric acid each, two weeks apart. Combined injection rates more than doubled, from 4,000 to more than 8,500 barrels per day, at last report. Also, the injection pressure has averaged 300 psi lower than previous requirements. These results were better than any previously obtained with hydrochloric acid treatments.

Other operators using citric acid have noted good results because of less frequent downtime on filters, and less replacement of parts because of rusting.

If you have been experiencing problems caused by iron precipitation in your injection water, write Pfizer for full information on the use of citric acid for iron sequestering.

*registered trademark Rohm & Haas Co.

Science for the world's well-being

Pfizer

Manufacturing Chemists for over 100 Years

CHAS. PFIZER & CO., INC.
CHEMICAL SALES DIVISION
630 Flushing Ave., Brooklyn 6, N.Y. Branch Offices: Clifton, N. J.; Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Texas; Montreal, Canada

For more data on advertised products, use Readers' Service Cards, last page.

Serving the oil industry for more than a quarter-century — with inventive know-how and the best service in the business.

This one will jar you!

This combination jar and keyseat broach is an improved design — engineered to provide positive jarring action when necessary.

With more cutting surfaces than ever before, this Hunt-McClinton tool does a faster, better job.

For details, write Hunt Tool Company or telephone Houston. FA 3-7131.

built on good service

HUNT
TOOL COMPANY
Houston, Texas

Pelton Division, Baldwin-Lima-Hamilton Corp.
Booth 34, Park Lane

PRODUCTS DISPLAYED:
Pelton Motor Operators.

Pittsburgh Steel Co.
Booths 4, 5, 6, Texas Building

PRODUCTS DISPLAYED:
Seamless Drill Pipe; Casing and Tubing; Seamless Tubular Specialties; Sheet Steel including Pattern Rolled and Specialty Strip; Manufacturers' Wire and Specialty Wires.

Tom Wheatley Company, Inc.
Booth 238, Oklahoma Building

PRODUCTS DISPLAYED:
"Conduit" Check Valves; Full opening Conventional Check Valves; Streamline Strainers; Sure-Seal Blanking Plug; Welding Pipe; Flange Wraps.

Marathon Electric Mfg. Corp.
Booths 206, 207, Oklahoma Bldg.

PRODUCTS DISPLAYED:
Integral H.P. Oil Field Pumping Motors.

Gaso Pump & Burner Mfg. Co.
Block W

PRODUCTS DISPLAYED:
Duplex Horizontal Piston Power Pumps; Triplex Horizontal Plunger Pumps.

Bendix-Westinghouse Automotive Air Brake Co.
Booths 74, 75 North Area

PRODUCTS DISPLAYED:
Truck and Trailer Air Brake Systems; Industrial Air Controls and Devices; Driver Reaction Timer; Air Starting Motors.

OTM Corporation
Booths 29, 30, S & T Building

PRODUCTS DISPLAYED:
Forged Steel Flanges; Welding Fittings.

Continental Tube Co.
Booth 26, Park Lane

PRODUCTS DISPLAYED:
Casing Samples; Turbo-Drill Pipe; Tubing.

Gatke Corporation
Booths 23, 24, 25, California Bldg.

PRODUCTS DISPLAYED:
Brake Lining; Brake Blocks; Clutch Facings; Frictions; Moulded Fabric Bearings and Bushings.

Oklahoma Steel Castings Co., Inc.
Booths 47, 48, Texas Bldg.

PRODUCTS DISPLAYED:
Castings.

Vinson Supply Company
Booths 76, 77, 134 and 135, Texas Bldg.

PRODUCTS DISPLAYED:

Controllers; Motor Valves; Automatic Control Equipment; Tubular Goods; Valves.

Wichita Clutch Co.
Booth 26N, North Area

PRODUCTS DISPLAYED:

Catheads (Air); Disc Clutches (Air); Disc Brakes (Air).

Oklahoma Rig & Supply Co.
Booth 4, Oklahoma Building

PRODUCTS DISPLAYED:

Hickory Tool and Shovel Handles.

Stewarts and Lloyds Ltd.
Booths 78N, 79N

PRODUCTS DISPLAYED:

Casing; Tubing; Line Pipe; Welded Fittings.

Velocity Power Tool Company
Booth 115, Oklahoma Building

PRODUCTS DISPLAYED:

Lawco Jr. Portable Pipe Threader; Green Hornet Stud Driver; Model P. Stud Hammer.

Continental Motors Corporation
Block P

PRODUCTS DISPLAYED:

Diesel, Natural Gas, Gasoline Oil Field Engines, Aircraft Engines.

Equipto Division Aurora Equipment Co.
Booths 47N, 48N

PRODUCTS DISPLAYED:

Steel Shelving; Steel Drawer Units; Work Benches; Slotted Angle; Steel Trucks.

Austin-Western
Block 5

PRODUCTS DISPLAYED:

Hydraulic Cranes.

Allen Gauge & Tool Co.
Booth 64, Kansas Bldg.

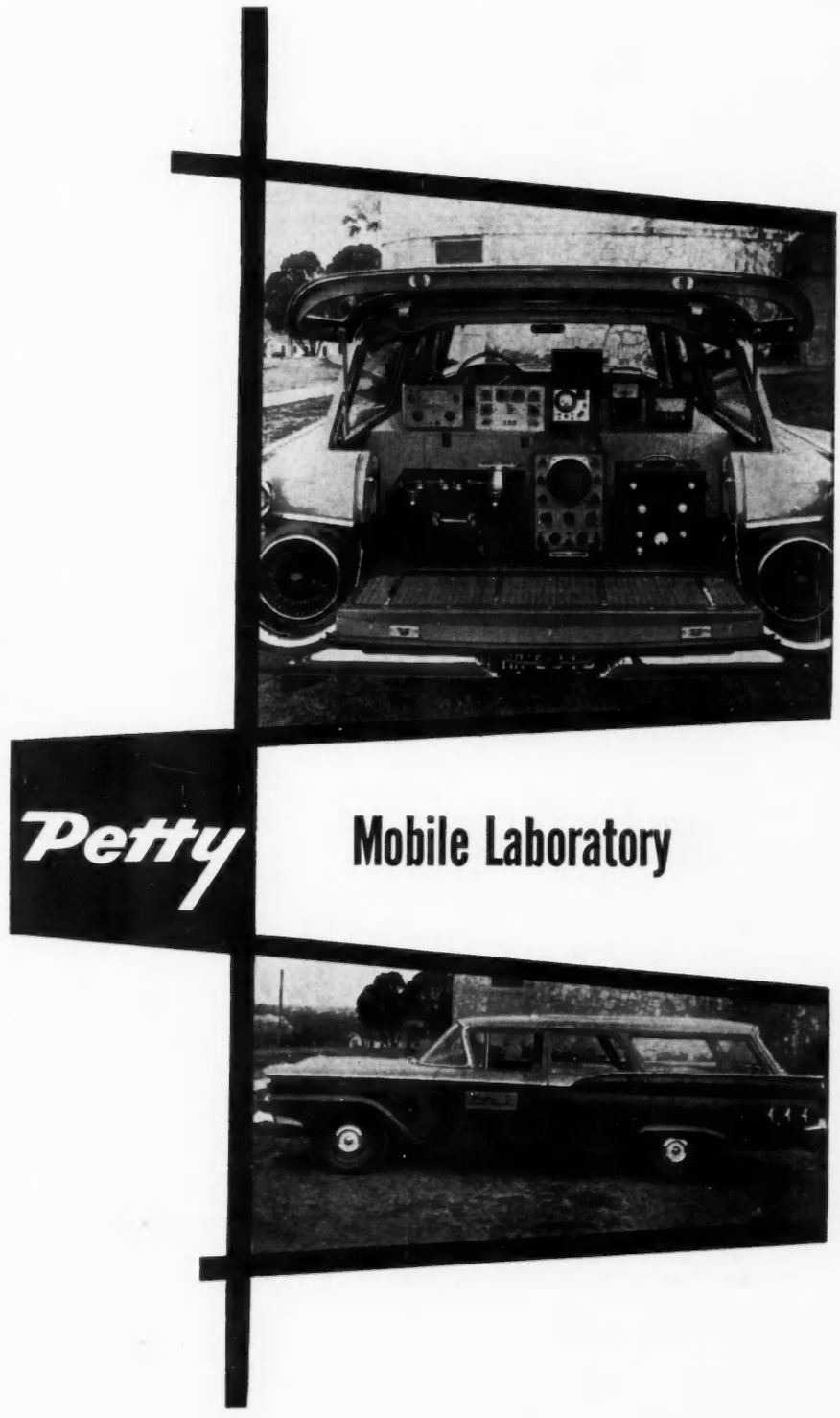
PRODUCTS DISPLAYED:

Allen Gages, Checker & Calibrator; Portable Thread-Contour Comparator; Reflectorscopes; Triple Point Thread Markers; Triple Point Thread Scrapers; Ball Points & Cone Points; Inspection Kits; Coupling Wrench; Thread Protector Chain Wrench; Pit Depth Gage-Long Anvil; Pipe Drifts; Inspection Lights.

Perry Equipment Corporation
East End, California Bldg.

PRODUCTS DISPLAYED:

Oil, Air, Gas, Water and Process Filters; Liquid Gas Separators; Liquid/Liquid (Phase) Separators.



Petty
GEOPHYSICAL ENGINEERING CO.
TRANSIT TOWER SAN ANTONIO CApitol 6-1393

The Petty Mobile Laboratory takes laboratory test procedures to the field and insures Petty clients of optimum instrument performance at all times.

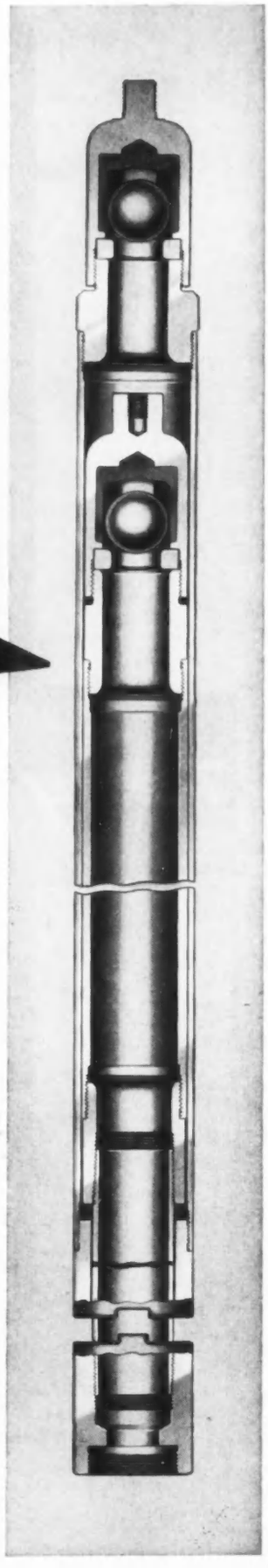
Foreign Experience Since 1927

NEVER CONTENT TO BE "AS GOOD AS"... ALWAYS STRIVING TO BE "BETTER THAN"

For more data on advertised products, use Readers' Service Cards, last page.

*Designed for Your Waterflood**

*WITH THIS **PACIFIC** INSERT ROD PLUNGER PUMP YOU GET VOLUME *plus*



1 A precision insert rod pump of 4½" O.D. x 3¾" I.D. built to Pacific standards.

2 A specifically designed pump for pumping large volumes of fluid efficiently **at any speed**—fast or slow—with a conventional pumping unit installation.

3 A pump that will seat in a regular production casing packer and may be operated in 5" casing (or larger) thereby eliminating tubing.

4 A pump ideally suited for pumping water supply wells in the range of 2000 to 3000 barrels of fluid per day for water flooding operations.

5 A pump equipped with Pacific Pacilite chrome plungers and the latest design rubber lined cages for long trouble-free operation.

Ask your Pacific field salesman for more details or write:

PACIFIC PUMPS, INC.
A DIVISION OF DRESSER INDUSTRIES, INC.
HUNTINGTON PARK, CALIFORNIA

Mid-Continent:
P. O. Box 5428
Tulsa 16, Oklahoma

Canadian Division:
9707 • 63rd Avenue
Edmonton, Alberta

PACIFIC®

DW-18

Weatherford Oil Tool Co., Inc.
Booths 114, 115

PRODUCTS DISPLAYED:
Weatherford Reversible Scratchers; Centralizers; Cementing Techniques; Drill Pipe Wipers; Float Equipment; Tong Pull Back Springs; Rapid-Tectors.

Ozark-Mahoning Company
Booth 1, Texas Drive

PRODUCTS DISPLAYED:
Methods of removal of hydrogen sulfide or dissolved oxygen from brines or flood waters.

Cherokee Steel, Inc.
Block 205, North Area

PRODUCTS DISPLAYED:
Tuf-Plug; Compressors; LACT Sampler

Bos-Co Equipt. Engrg. & Mfg. Co.
Block 208, NW Corner

PRODUCTS DISPLAYED:
Engine Starter; Pipe Anchors; Packaged Pump Units; Strainers; Power Scythe; Chemical Feeders; Plastic Pipe; Plastic Products; Plastic Paint.

Seismograph Service Corp.
Booths 75, 76, S. T. Bldg.

PRODUCTS DISPLAYED:
Wire Line Borehole Surveying Services

Tuboscope Company
Booths 1, 2, Texas Bldg.

PRODUCTS DISPLAYED:
Tube-Tectors Drill Pipe Casing Protectors; Methods of inspecting new and used drill pipe, new and used tubing, new and used casing, used sucker rods.

Brown Oil Tools, Inc.
Booths 59, 60, Texas Bldg.

PRODUCTS DISPLAYED:
HS-16-1, HS-8-1, HS-8-2, HS-8-3 Hydraulic Set Packers; Camlok Packer; Duo-Pak Packer; B-4 Mechanical Set Packer; Boll Weevil Packer; RS-1, RS-2 Packer; Type BP-4 Packer; Type 4-A Packer; DS-4, DS-9-2H, DS-8, DS-3-3 Packers; Tubingless Completion Equipment.

General Valve Company, Inc.
Booths 86, 87, Kansas Bldg.

PRODUCTS DISPLAYED:
Twin Seal; Duo Seal; Models S and [illegible] Non-Lubricated Plug Valves.

Line Scale Co., Inc.
Booth 205, Oklahoma Bldg.

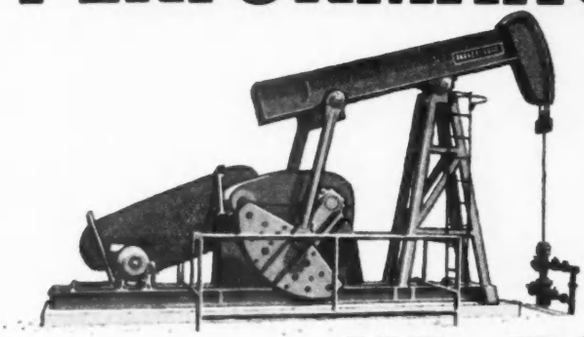
PRODUCTS DISPLAYED:
Steam Cleaners; Weight Indicators; Nylon Valves and Seats; Mud Pressure Gages.

Peerless Pump Division F.M.C.
Booths 11, 12, Oklahoma Bldg.

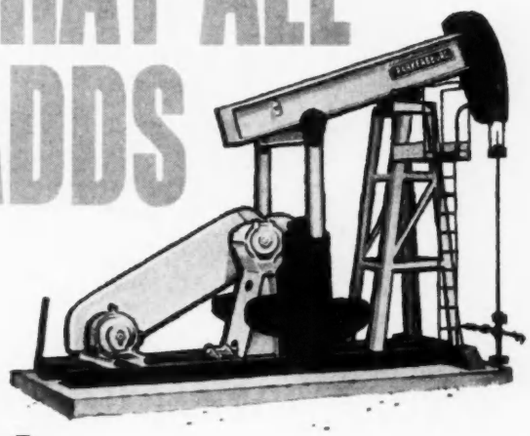
PRODUCTS DISPLAYED:
Secondary Recovery Pumping Equipment.

TOP PERFORMANCE

ANOTHER
PARKERSBURG
OUTSTANDING
ENGINEERING
ACHIEVEMENT



THAT ALL ADDS UP TO



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Careful attention to detail, from engineering to the complete product, is your assurance of dependable performance in every **PARKERSBURG** Pumping Unit. From the smallest to the largest heavy-duty units, **PARKERSBURG** Pumpers are famous for economy and longer trouble-free operation.

PARKERSBURG for pumping units of *every* type to meet *every* need.

PARKERSBURG for the most complete line of *wide-base portable units.*

PARKERSBURG for *quality products* at *competitive prices.*

PARKERSBURG for *experience* and *know-how* . . . over 25 years in the pumping unit field.

PARKERSBURG for a *field service* surpassed by none.

PARKERSBURG for the most *prompt delivery* possible, direct to your lease.

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PARKERSBURG
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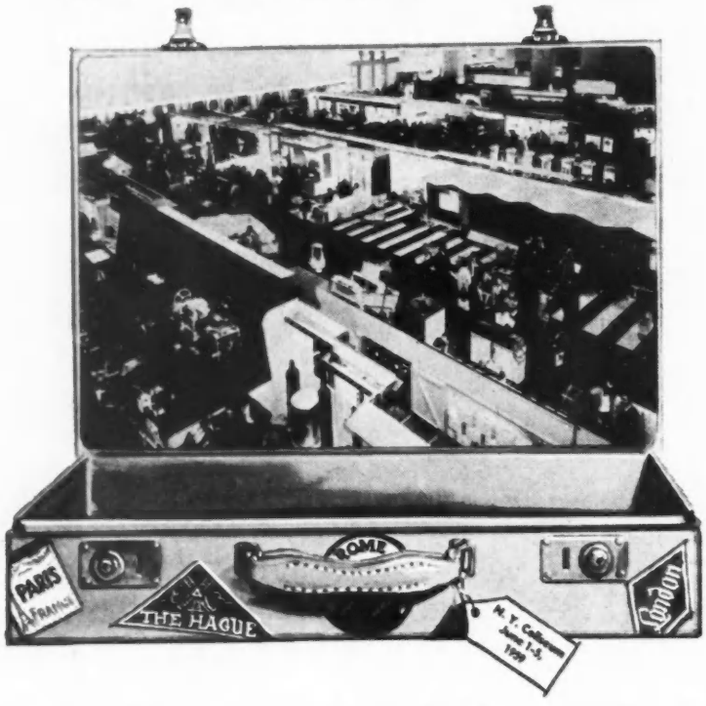
PESA

Parkersburg Pumping Units are available through the following supply stores: American Pipe & Supply Co., Beacon Supply Co., Bovaird Supply Co., Canadian Equipment Sales & Service Co., Ltd., C. W. Cotton Supply Co., Franklin Supply Co., Houston Oilfield Material Co., Inc., Industrial Supply Co., Iverson Supply Co., Midland Supply Co., Inc., Mountain Iron and Supply Co., Murray-Brooks, Inc., The Producers Supply & Tool Co., Republic Supply Co., Rodman Supply Co., Superior Iron Works & Supply Co., United Supply & Manufacturing Co., Wilson Supply Co.

In the U.S.A. for the First Time



See, Learn and Compare the newest products, materials and services

Whatever your interest – oil research, production, refining, transportation – you will find many valuable new ideas presented at this fact-filled exposition.

You will have the opportunity to see and discuss the newest equipment, methods, services and materials with the informed representatives of some 275 leading concerns serving the petroleum and petrochemical industries.

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For advance registration and hotel information write the Exposition at 480 Lexington Avenue, New York 17, N. Y.

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New York Coliseum
June 1-5, 1959

Management: International Exposition Co. 1273

Ford Division
Ford Motor Company
Block 6E

PRODUCTS DISPLAYED:
Trucks; Converted Passenger Vehicle; Industrial Engines and Power Units; Industrial Tractors.

Supply Division
Jones & Laughlin Steel Corp.
Block 1

PRODUCTS DISPLAYED:
Drill Pipe; Casing; Tubing; Line Pipe; Steel Jacketed-Plastic Pipe; Wire Rope; Steel Shipping Containers.

Walker Well Heads, Inc.
Booths 39, 40, Silver Lane

PRODUCTS DISPLAYED:
Casing Heads; Tubing Heads; Christmas Trees.

Duff-Norton Co.
Booth 155, Oklahoma Bldg.

PRODUCTS DISPLAYED:
Jacks—mechanical, hydraulic and screw; Hoists—hand chain, ratchet lever.

Robbins & Myers, Inc.
Booths 52N, 53N, 54N, 55N

PRODUCTS DISPLAYED:
Electric Motors; Pumps.

Grove Valve and Regulator Company
Booths 36, 37, Texas Bldg.

PRODUCTS DISPLAYED:
2-inch to 36-inch Cast and Fabricated Gate Valves; Pressure Reducing and Back Pressure Regulators; Grove Christmas Tree Valv-Pac; Bar Stock Valves; G-5 Gate Valves.

Moran Furnace & Sheet Metal Co.
East of Kansas Bldg.

PRODUCTS DISPLAYED:
Moran Safety Heater; Draft Equalizing Stack Heads; Positive Draft Controls.

Branson Instruments, Inc.
Branson Ultrasonic Corp.
Booth 17, Silver Lane

PRODUCTS DISPLAYED:
Audigage Ultrasonic Thickness Testers, Models FMSS-t and FMSS-6 (transistorized); Vidigate Ultrasonic Thickness Tester Model 14; Sonoray Pulse Echo Flaw Detector, Model 5; Sonogen Ultrasonic Cleaner.

Instruments, Inc.
West of Block S

PRODUCTS DISPLAYED:
Electr-O-Probe B-04, 05 and 06; Mic-O-Flex and Snap-O-Matic, Mic-O-Float Level Controls; BS&W Monitor and Capacitance Product Analyzer; Therm-O-Trol Temperature Control; LACT Control Panels; Electric Net Barrel Counters; Micro Valve.

For economical pumping choose from these Bethlehem rods

These four types of Bethlehem sucker rods will handle a wide range of pumping conditions. Each rod is carefully made and thoroughly inspected, and can be counted on to keep strings in the hole for long periods of time. If you have any question about the use of these rods, or about Bethlehem's full line of sucker rod accessories, get in touch with your Bethlehem sucker-rod distributor. Or, if you prefer, the nearest Bethlehem sales office will gladly give you full details.

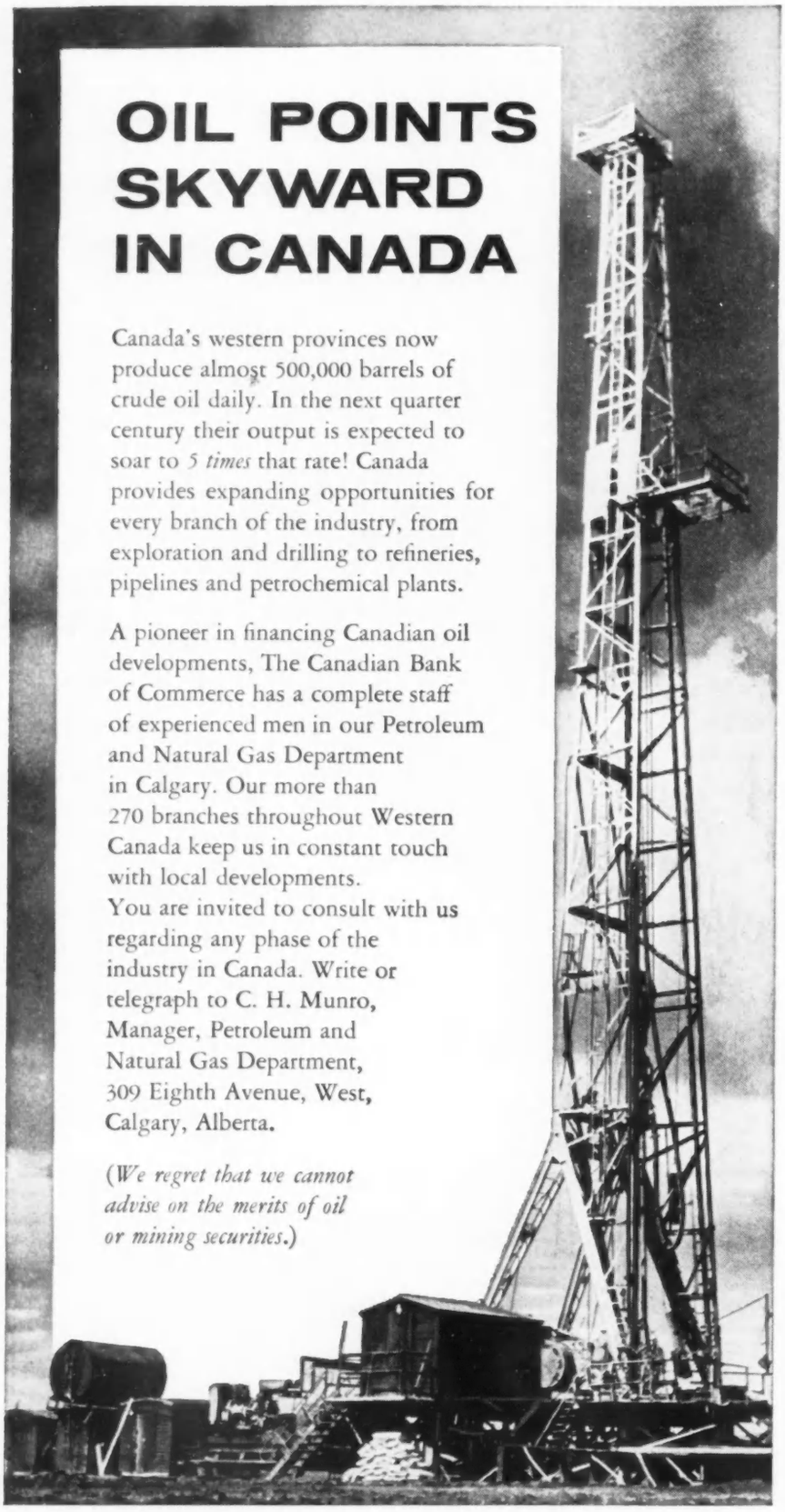
ROD	TYPE	HEAT TREATMENT	YIELD POINT, psi		TENSILE STRENGTH, psi	
			Min.	Av.	Min.	Av.
X 2	Carbon-manganese	Normalized	65,000	72,000	93,000	100,000
X Mayari	Nickel-chromium	Normalized	60,000	65,000	88,000	95,000
46	Nickel-molybdenum	Normalized and tempered	67,000	75,000	82,000	90,000
43	Nickel-chromium-molybdenum	Normalized and tempered	100,000	110,000	120,000	130,000

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



OIL POINTS SKYWARD IN CANADA

Canada's western provinces now produce almost 500,000 barrels of crude oil daily. In the next quarter century their output is expected to soar to *5 times* that rate! Canada provides expanding opportunities for every branch of the industry, from exploration and drilling to refineries, pipelines and petrochemical plants.

A pioneer in financing Canadian oil developments, The Canadian Bank of Commerce has a complete staff of experienced men in our Petroleum and Natural Gas Department in Calgary. Our more than 270 branches throughout Western Canada keep us in constant touch with local developments. You are invited to consult with us regarding any phase of the industry in Canada. Write or telegraph to C. H. Munro, Manager, Petroleum and Natural Gas Department, 309 Eighth Avenue, West, Calgary, Alberta.

(*We regret that we cannot advise on the merits of oil or mining securities.*)

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London, England, West Indies and Nassau, Bahamas

Resident Representatives—Chicago and Dallas and more than 800 branches across Canada

M. M. Kinley Co.

Booth 38, Silver Lane

PRODUCTS DISPLAYED:

Tubing Caliper; Tubing Perforator; Sand Line Cutting Gun; Tension Jar.

The Lincoln Electric Co.

Booths 201, 202, 249, 250, 251, Oklahoma Bldg.

PRODUCTS DISPLAYED:

"Mechanized Squirt Welder" ML-3 automatic and hand guided submerged arc welding of pipe flange, fittings and structural shapes.

Ross-Martin Company

Booth 13, S. and T. Building

PRODUCTS DISPLAYED:

Kraftbilt Electric Log Filing Cabinets; Rolled Map Filing Cabinets; Strip Log Filing Cabinets.

Wheeling Machine Products Company

Booth 94, Oklahoma Bldg.

PRODUCTS DISPLAYED:

API Casing; Tubing; Line Pipe Couplings.

Thompson Pump Co.

Booth 132, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Sub-Surface Oil Well Pumps and Accessories; Inverted Combination Plunger and Cup Pump; All Metal Traveling Valve Plunger and Cup Pump; All Metal Rod Type; All Metal or Combination Cup and Plunger; Rod Guides and Bronze Rod Boxes; Steel Cup Plunger Assemblies; Sand Housing and Seating Device; Seating Nipples.

Hillman-Kelley

Block 203, North Area

PRODUCTS DISPLAYED:

Power Tubing Tongs; Power Sucker Rod Wrench; Power Casing Tong; Macaroni Head; Power Units.

Johnson-Fagg Engineering Co.

Booth 29, Park Lane

PRODUCTS DISPLAYED:

Little Giant Polished Rod Clamp; Stuffing Box; Polished Rod Liner; J-F Dynamometer; Weight Indicator; Pumping Tee.

Pacific Pumps Inc.

Block 11

PRODUCTS DISPLAYED:

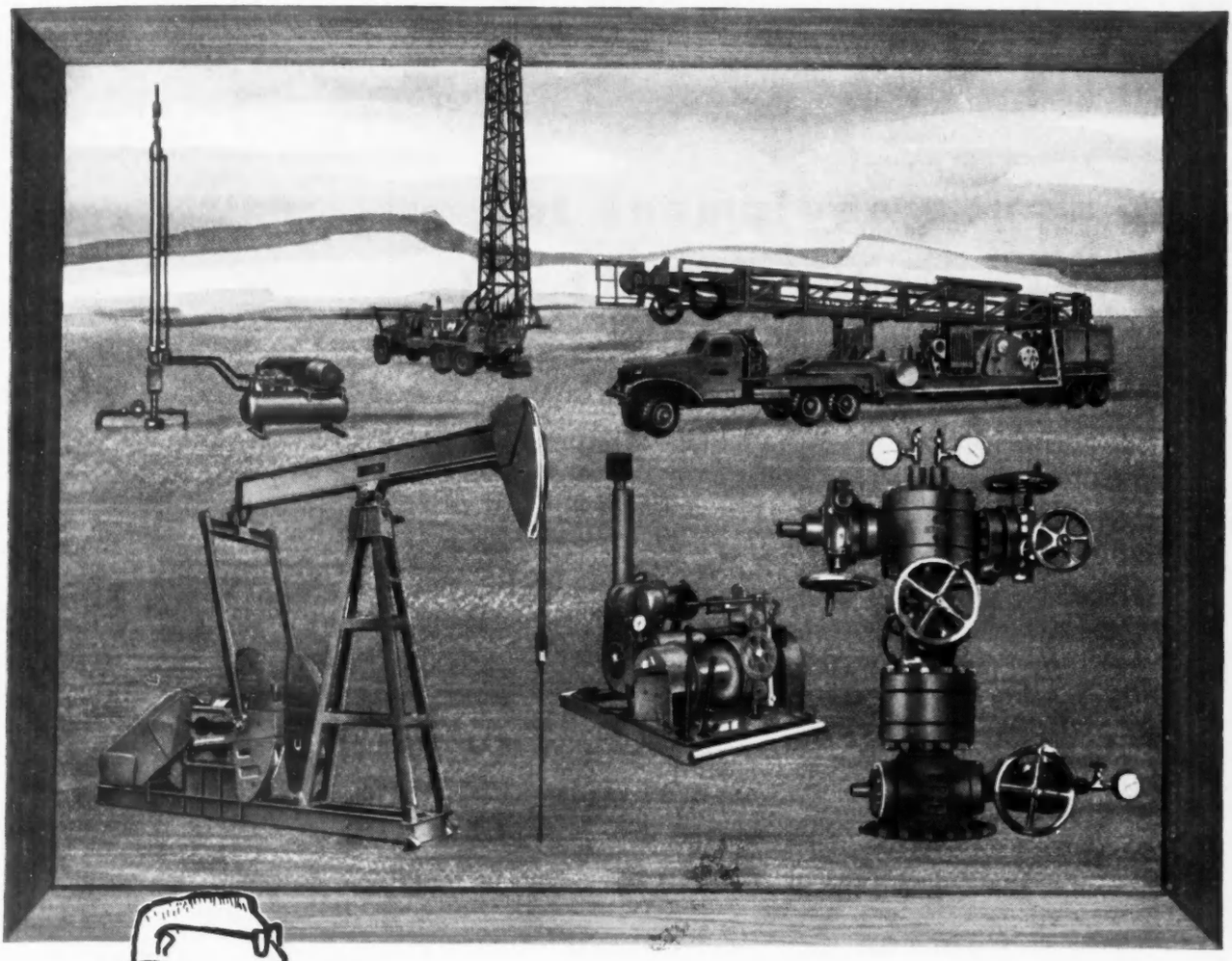
Centrifugal, Oilwell, Sludge, Turbine Pumps.

Orbit Valve Co.

Booths 33, 34, 35, Texas Building

PRODUCTS DISPLAYED:

Valves.



Oil-scape
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"L" Series Pumping Units
Le Grand—O.C.T. Wellhead Equipment
Le Grand—Halliburton Floating Equipment & Measuring Devices

Le Grand—Davey Light Drilling Rigs
Le Grand—Carter Hydraulic Pumping Units
Le Grand—Cardwell Service & Workover Rigs

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Represented in the following areas: CANADA, TRINIDAD, VENEZUELA, WESTERN AND EASTERN, (MIDDLE EAST)

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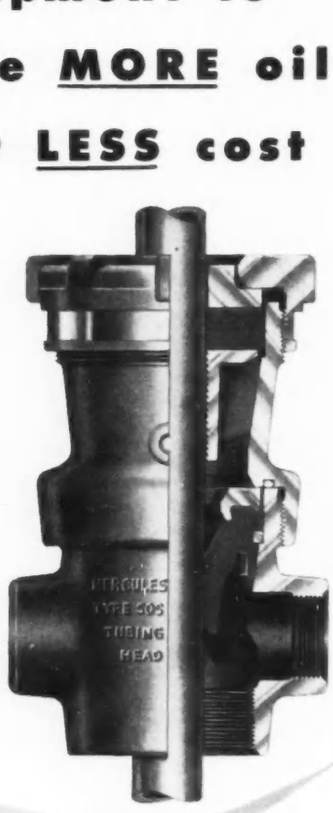
100 YEARS OF PETR. HERCULES 35 ANNIVERSARY 1924 1959 TOOL TULSA

equipment to produce MORE oil at LESS cost

HERCULES TYPE SOS

TUBING HEAD

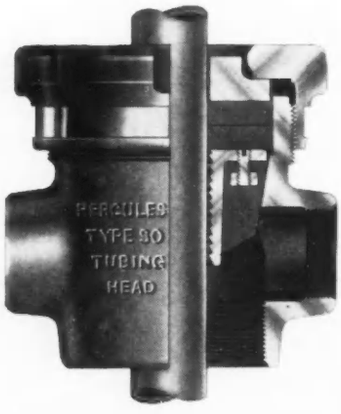
Hercules "Type SOS" is a 4000 pound test stripper tubing head. The lower section contains the neoprene tubing stripper; the upper section or bowl contains the slips and packing arrangement. The SOS is unsurpassed for use in well servicing operations in addition to its use in flowing wells.



HERCULES TYPE SO

TUBING HEAD

Hercules "Type SO" tubing head is actually the lower section of the "Type SOS" tubing head, containing the slips and packing arrangement. It is particularly suitable for pumping due to its compactness, being approximately 12 inches high.



HERCULES TOOL TULSA

HERCULES Products are sold through All Supply Stores

HERCULES TOOL COMPANY

Manufacturers of Oil Field Equipment

GENERAL OFFICES AND PLANT • TULSA, OKLAHOMA

Export Representative Oil Field Equipment Co., Inc. 90 West Street, New York, N. Y.

Chain Belt Company

Booths 99, 100, 111, 112, Texas Building

PRODUCTS DISPLAYED:

API Precision Roller Chains, Shafer Self-Aligning Roller Bearings, Centrifugal Pumps, A.S.A. Roller Chains, Multiple Strand Drive and Glide Fit Chains.

Walter O'Bannon Company

Booths 85, 86, Oklahoma Building

PRODUCTS DISPLAYED:

Sub-Surface Pumps; Well Servicing Tools.

Welex, Inc.

Booths 57, 58, Texas Building

PRODUCTS DISPLAYED:

Logging & Perforating Equipment.

Perforating Guns Atlas Corporation

Booth 81, S & T Building

PRODUCTS DISPLAYED:

Electrical Logging; Nuclear Logging; Spectral Logging Services & Equipment; Bullet and Jet Guns; Perforating Techniques; Strata Test Equipment.

Briggs & Stratton Corp.

Booths 13, 14, Oklahoma Building

PRODUCTS DISPLAYED:

Single Cylinder; 4-Cycle Gasoline Engines.

Lufkin Foundry & Machine Company

Corner, Texas Drive and Mid-Continent Drive

PRODUCTS DISPLAYED:

Conventional and Air Balanced Pumping Units; Gas Engines; Commercial and Marine Gears.

American Brass Company

Booths 55, 56, Texas Building

PRODUCTS DISPLAYED:

Condenser Tubes; Tube Sheets; Red Brass Pipe; Copper Tube and Fittings; Everdur Conduit; Welding Rods; Metal Hose Products; Instrument Tubing.

Wyman-Gordon Company

Booths 53, 54, 55, Oklahoma Bldg.

PRODUCTS DISPLAYED:

Closed Die Forgings: Aluminum; Magnesium; Beryllium; Rene 41; Carbon Steel; Alloy Steel; Stainless Steel; High Temperature Alloys.

Chicago Pneumatic Tool Company

Block W

NEW PRODUCTS DISPLAYED:

CP-612 Reversible Torque-Control Impact Wrench with power saving spline shank is designed for erection, modification and equipment maintenance operations. Wrench has ample capacity for heavy duty 1½ inch bolts.

Circle No. 326 on Postcard, Page 287

ES-1C Rock Bit has extra long and widely spaced teeth for drilling in soft formations. This design assures rapid drilling rates because of minimum tooth contact on bottom, deep penetration into the formation, and large cuttings. Its deleted-tooth arrangement facilitates passage of larger cuttings from bottom. Cutting action makes bit particularly suitable for drilling with light weight in crooked holes.

Circle No. 327 on Postcard, Page 287

EM-IV Three Cone Rock Bit

EM-1V Three-Cone Rock Bit is designed for less than medium-hard formations. Deleted heel teeth increase "ventilation" and produce high penetration rates in formations where excessive gage wear is not anticipated.

Circle No. 328 on Postcard, Page 287

EH-4 Rock Bit has new concept in tooth arrangement and design that guarantees deep hole penetration in most abrasive formations. Heat treated for maximum resistance, the teeth feature rounded crests, individually formed for high compressive strength.

Circle No. 329 on Postcard, Page 287

OTHER PRODUCTS DISPLAYED:

GTD-400 Trenchdril with twin four-inch deep hole drills; CP-600 "Power Vane" Rotary Compressor.

Ramsey Winch Mfg. Company

Silver Lane, No. of Calif. Bldg.

PRODUCTS DISPLAYED:

Winches, Speed Reducers, Industrial Transmissions, Right Angle Gear Boxes, Power Takeoffs.

THERE ARE ALL KINDS OF

CEMENT...

BUT JUST ONE BEST

CEMENT ADDITIVE

FOR OIL WELLS!

ONLY Strata-Crete 6

® TRADE MARK

GIVES YOU ALL 6!

This improved perlite cement additive generally ***lowers fill-up cost,*** and is ***easier to place*** (requires only normal pump pressures). ***Superior bridging qualities*** and light weight assure complete fill-ups, and the greater resiliency ***reduces fracturing and shattering.*** Strata-Crete 6 can be used with ***any type or brand of cement*** and in itself is ***not affected by high well temperatures.***

Strata-Crete 6 can be obtained from your oil well cementing service company.

GLC

GREAT LAKES CARBON CORPORATION

MINING & MINERAL PRODUCTS DIVISION — STRATA PRODUCTS DEPARTMENT

1404 NIELS ESPERSON BUILDING HOUSTON 2, TEXAS

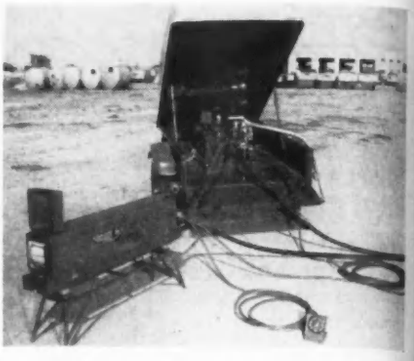
Halliburton Oil Well Cementing Co.

Block K

NEW PRODUCTS DISPLAYED:

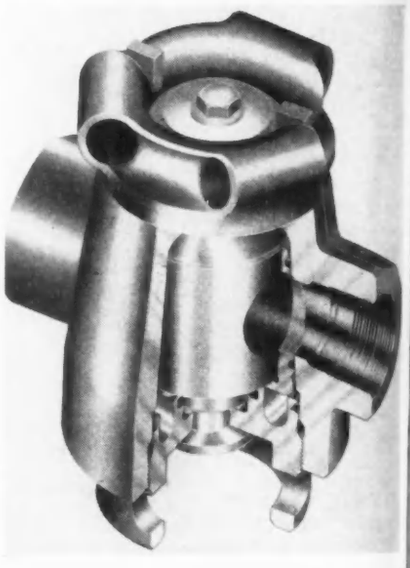
Halliburton HT-400 Cementing Truck is equipped with two HT-400 pumps, adapted from original pump used for fracturing. Each pump is powered by 335-horsepower Cummins NRTO diesel, independently driven through torque converter and constant mesh, full shifting power planetary gear transmission. Each pump delivers more than 260 hydraulic horsepower. Controls are remotely located at centralized point near the 20 barrel calibrated tank and positioned for operating convenience, relative to slurry mixing tub, mixing and tank manifolding, tank observation and transmission. Unit can mix or displace 40-plus sacks of cement per minute.

Circle No. 340 on Postcard, Page 287



Halliburton Densometer is designed for measuring density of various fluids. It provides continuous reading of density in pounds per gallon on a gage and makes permanent record of fluid density on strip chart recorder. Virtually error-free, the instrument will measure density of cement slurry or drilling fluid within plus or minus 1 percent of full scale reading over its 6 to 21 pounds per gallon range scale. It is not sensitive to various weather elements or radioactive emission, so that a succession of various fluids can be measured with same accuracy for one calibration. Densometer is not sensitive to pressure, velocity, and viscosity changes in fluid flowing through the loop. Its ability to continuously sample and record density of a fluid is valuable and unique in its field.

Circle No. 341 on Postcard, Page 287



Halliburton Lo-Torq Plug Valve is designed to handle oil field fluids ranging from cement slurries to acids. Valve operates with minimum difficulty, withstands more pounds of pressure, yet it only weighs 60 pounds in 2-inch size and 40 pounds in 1 inch. It is readily adjusted for correct operating torque. Valve has wide range of uses in drilling, mud systems and on christmas trees, trucks, discharge and release lines. It is also used in squeeze cementing, testing manifolds and fracturing heads. Multi-purpose valve is most beneficial at high pressures from 10,000 to 15,000 psi.

Circle No. 342 on Postcard, Page 287

Halliburton Solid Set Screw Limit Ring provides superior locking power that has held loads up to 14,000 pounds while positioning casing equipment. Device affords economical and dependable method for installing accessory equipment on casing and limiting their movement without welding lugs or rings to casing. The ring has 3/8-inch by 3/8-inch hex socket head cup point set screws arranged around and

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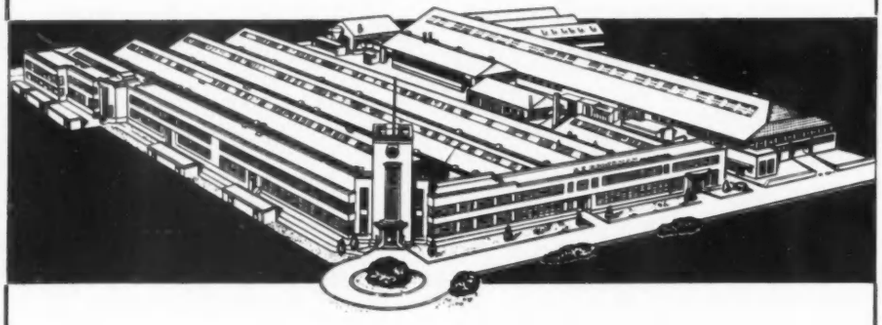
WISHING TO PRODUCE THEIR GOODS IN THE

STERLING AREA



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International Petroleum Exposition

MAY 14-23, 1959
Tulsa, Oklahoma

CONTINENTAL-EMSCO

"D" Series Pumps

OUTPERFORM them all

Continental-Emsco "D" Series Pumps have proven themselves on drilling locations the world over.. proven they are heavy enough to handle the volumes and pressures demanded by modern drilling.. yet light enough to save you money in transportation costs and rig-up time.

This *proven* combination of weight and performance comes from weight reducing Fabriform construction and a rugged herringbone gear train that provides smooth, steady power. With Fabriform, steel plates and shapes are used in place of heavy, bulky single castings.. giving you low weight with improved performance. Simplified maintenance is another time-saving feature of the "D" Series Pumps. There are no power end adjustments to make .. no greasing to do.. lubrication is completely automatic.

More *proven* advantages are yours with Continental-Emsco Slush Pumps.. get all the facts about big performance.. low weight "D" Series Pumps.

SIX SIZES – D-175, D-300, DA-500, D-700, DA-850, D-1000

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CONTINENTAL-EMSCO COMPANY

SP 804

Steel mill finishing operations, like threading this length of casing, show how steelmakers are part of the driller's team because . . .

Texas Wells Begin in Pittsburgh Steel's Mills

Skilled tube makers with half century's experience and distributors whose first loyalty is to you, join your team when you use Pittsburgh Steel Co.'s API Oil Country Goods.

We never saw an oil rig set up in a steel mill but we maintain that's where every well begins. Just as you start digging a ditch by getting a shovel, so the first step in drilling an oil well is getting rugged, dependable materials like drill pipe, casing and tubing.

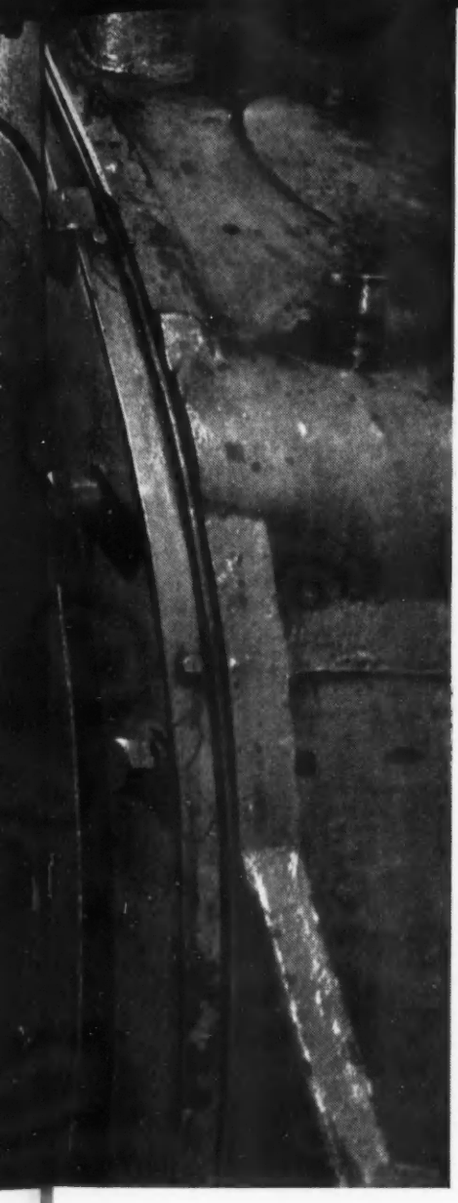
That's where Pittsburgh Steel Co. starts its partnership with the oil man. If the steelmaker has been producing good materials for nearly 50 years—and Pittsburgh Steel has—he's a good bet to team up with.

You have an added advantage in that Pittsburgh Steel Co. is linked to you by independent distributors whose first loyalty is to you, the customer.

Independent distributors handling Pittsburgh Steel's oil country goods are a good bet for another reason. They move fast to keep up with al technological advances in oil we drilling. They must because the stay in business only because the give you what you want, when yo want it.

Let a typical Mr. Independen Distributor tell what's been goin on in the oil business recently:

• **Drilling Comes of Age**—"O well drilling has come of age sinc World War II," said this Texas dis tributor. "There was a day whe setting up a rig in a new locatio meant moving half a distributor store out there. A telephone call t



The independent distributor's store is a big-time operation with better stocks than ever.

the store was likely to end with a reminder to 'Bring a 4x1 swedge.' The distributor's man knew what that meant. It took as long then to set up a rig as it does now to bring in the well.

"Today it's a business for trained, industrious and intelligent men. Portability of rigs, dual completions, mud engineering—all the technological advances have speeded up drilling and made it a precise, scientific operation. Oil men plan better now; they look further ahead."

As a producer of API oil country goods, Pittsburgh Steel also has stepped up quality to meet drillers' demands. Torsional strength, surface quality and resistance to fatigue stresses and collapse all have steadily improved as drillers probed deeper in the earth and encountered greater pressures.

Pittsburgh Steel provides the driller with tubes that have defect-free surfaces and dense, sound grain structure which can take the strains of double piercing. Finishing operations, such as threading and testing, have kept pace.

That's why, with Pittsburgh Steel oil country goods on your rack, you can pick up any joint to start or end your string without worrying whether it will stand up.

Nothing less will do when you have a three-mile string rotating at 300 or 400 rpm with a total weight of perhaps 400,000 pounds hanging from the last joint! That's steel at it's best . . . the kind of steel you get from Pittsburgh Steel and Mr. Independent Distributor.

Put this combination on your team today. Pick up your telephone and call one of the independent distributors listed here. You'll get the best service you ever had—and the finest tubular products you can buy.

Distributor Home Offices

Bradford Supply Company
Bradford, Pennsylvania
Buckeye Supply Company
Zanesville, Ohio
Cardwell Manufacturing Co.
Wichita, Kansas
C. W. Cotton Supply Company
Tulsa 5, Oklahoma
Franklin Supply Company
Denver 10, Colorado
Houston Oil Field Material Co.
Houston, Texas
Industrial Supply Company
Wichita Falls, Texas
Iverson Supply Company
Tulsa, Oklahoma
Longhorn Supply Co., Inc.
Houston 14, Texas
Lucey Export Corporation
New York 7, New York
Lucey Products Corporation
Tulsa 19, Oklahoma
McJunkin Corporation
Charleston 22, West Virginia
Midland Supply Company
Wichita 7, Kansas
Mountain Iron & Supply Co.
Wichita 2, Kansas
The Producers Supply & Tool Co.
Fort Worth 2, Texas
Production & Refining Equipment Company
Odessa, Texas
Sandy Supply Company
Wooster, Ohio
Southwest Supply Company
Pittsburgh, Pennsylvania
Superior Iron Works & Supply Co.
Shreveport, Louisiana
Tex-Tube, Inc.
Houston 7, Texas
Western Supply Company
Tulsa 1, Oklahoma

Visit IPE Booths 4, 5, 6 – Texas Building

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

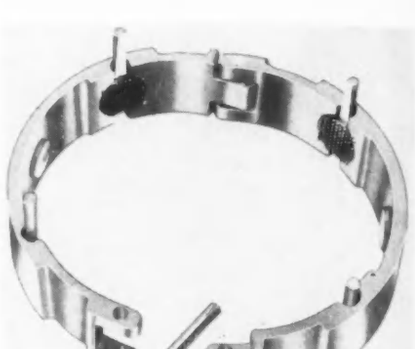
DISTRICT SALES OFFICES

Atlanta	Cleveland	Detroit	Los Angeles	Pittsburgh
Chicago	Dayton	Houston	New York	Tulsa
			Philadelphia	Warren, Ohio

through ¼-inch by 1-inch steel band. Screws are tightened with Allen set screw wrench and bite into casing, anchoring the ring and limiting travel of casing equipment. Six set screws are used on 4½-inch size rings, ranging up to 12 set screws for 16-inch size.

Circle No. 343 on Postcard, Page 287

Halliburton Vise-Lok Limit Clamp is non-weld limiting device which sets itself tighter to casing as more load is exerted against it; holds weight up to 20,000 pounds. Locking power results from file-hard teeth on four disc-shaped gripping slips which are part of precision forged hinged steel ring. Taper pins driven behind disc slips force them to bite into casing and thus anchor the clamp. Clamps are positioned so the head end of taper pins face equipment being held, the force



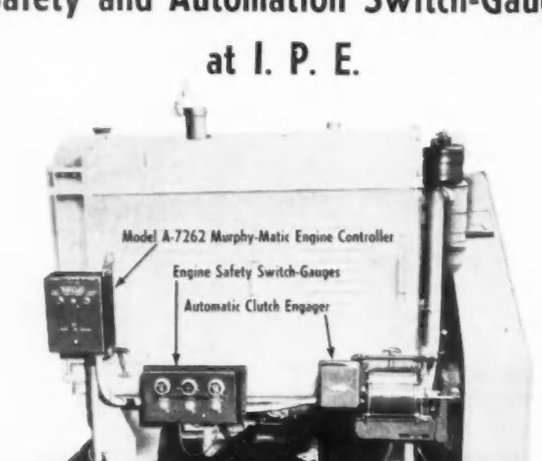
exerted by the equipment during pipe movement when it contacts the pins will make slips bite deeper and firmer to casing. Available in 4½, 5½, and 7⅝-inch casing sizes.

Circle No. 344 on Postcard, Page 287

MURPHY

See

Safety and Automation Switch-Gauges at I. P. E.



Pictured above — fully automatic pipeline pump — Murphy-controlled.

Be sure to visit our International Petroleum Exposition Exhibit in the California Building . . . and our plant at

3131 South Sheridan Road in Tulsa

Most complete line of Automation controls for Oil and Water level, Water, Gas and Oil Temperatures, Gas Compressors, Water Flood and Pipeline Pump Stations.

Safety fuel valves for Diesel and Gas
Custom made panels to your specifications

See our data in COMPOSITE CATALOG

FRANK W. MURPHY MANUFACTURER, INC.
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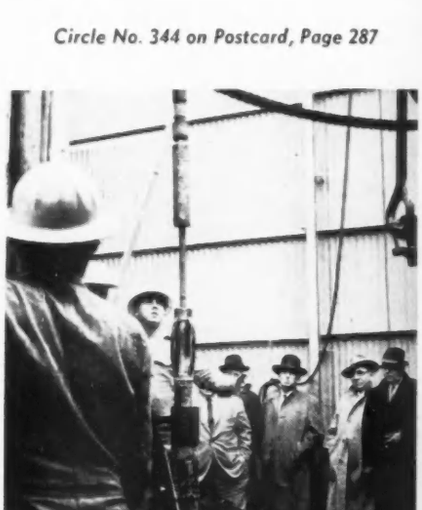
TULSA, OKLAHOMA

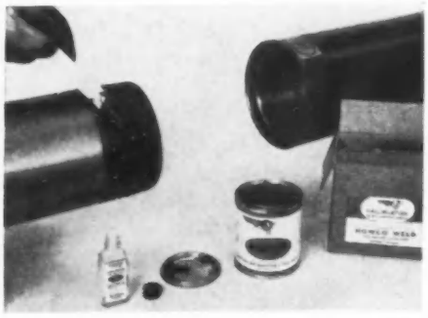
MURPHY SAFETY SWITCH OF CALIFORNIA
11812 Davenport Road • Los Alamitos, Calif.



Halliburton Hydraulic Wire Line Setting Tool permits economical setting of bridge plugs, squeeze and production packers. It may be used in wells with or without fluid; the necessary hydraulic fluid is carried in the tool. Only a light duty rig sand line is needed to operate, which reduces special setup and footage charges. Dependable accuracy is accomplished by "Tagging" bottom, "Flagging" line, or using depthometer on run-in-line. Tool contains hydraulic jack with two pistons and cylinders: one small and one large. These components are operated by wire line used to run tool and plug or packer into well. Back pressure valve, for pressure buildup, is located above setting sleeve so hydraulic pressure applied to sleeve by pump is unable to release until packer is set. Drag springs attached outside of tool helps prevent plug or packer from moving downhole during pumping operations before top slips are set. Available for use with Halliburton DM and DC Bridge Plugs, DM and DC Bridge Plugs, DM and DC Squeeze Packers, Wire Line Bridge Plugs and CL Production Packers in 4½-inch through 7⅝-inch casing sizes.

Circle No. 345 on Postcard, Page 287

CASING AND TUBING
BIG COST ITEMS IN ALL WELLS
WARRANT THE
SERVICES OF A SPECIALIST
ES
THE PIPE TO BUY IS
ATLAS PIPE INC.
511 First City National Bank Bldg., Phone: CApitol 3-4314, Houston 2, Texas
Houston Plant: 7707 Wallisville Road, Phone: ORchard 2-1704 • Corpus Christi Plant: P. O. Box 2368, Hwy. 44, Phone: TUlip 4-6371 • Tulsa: 2104 South Detroit, Phone: Diamond 3-6791.
ATLAS PIPE INC. IS AN ORGANIZATION OF
250 PEOPLE DEVOTED TO SELLING AND SERVICING
TUBULAR GOODS FOR THE PETROLEUM INDUSTRY



Howco Weld Thread Locking Compound is economical, convenient to use and apply. Package includes a pound can of thread locking compound, bottle of converter, and two wooden applicators. Converter fluid added to the inert resin acts as catalyst, immediately making it ready for application. To break out a connection, once Howco Weld is set, connection must be heated to 550°F. with a welder's torch. Weld is unaffected by temperatures up to 475°F. One pound of compound will lock four 4½-inch through 5½-inch couplings; two 7⅝-inch through 9⅝-inch couplings; or one 10¾-inch through 13⅜-inch coupling.

Circle No. 346 on Postcard, Page 287

Halliburton Gilsonite Cement is new additive for cement slurry that lightens slurry weight down to 10 pounds per gallon and has excellent bridging properties for lost circulation. It is solidified mineral processed in granular form for oil field use. Almost as light as water (specific gravity is 1.07), it adds volume but not weight to cement slurry and does not appreciably affect setting characteristics of slurry. Cement has low fluid requirements —each 50 pounds needs only two gallons of water. Each 100 pounds of the material represents two cubic feet of bulk volume. Cement column fill-up behind the pipe is easier with lightweight slurry containing Gilsonite Cement.

Circle No. 347 on Postcard, Page 287

Halliburton Hydro-Lok Control Agents for air and gas drilled wells aid in controlling the in-flow water. Water control agents include: PC-11, a plastic slurry consisting of a resin mix and inert solid materials which provides a squeeze material with fluid loss control. It can be pumped or used in dump bailer for various types of water control. HG-10 is the resin used to prepare PC-11. This relatively low viscosity resin can be used where deep formation penetration is necessary and a harder set than that obtained with PWG is desired. The set resin is insoluble in all known solvents. It has been both pumped and placed with dump bailer. PWG has very low viscosity which is maintained during 95 percent of its pumping life. When entering its setting base, a very stiff gel forms in the formation in less than an hour, thus reducing down-time. Gel strength is sufficient to hold back relatively high formation pressures. Continued drilling does not weaken water sealing properties of the agents.

Circle No. 348 on Postcard, Page 287

Halliburton Scalechek reduces clogging danger in the formation and tubular goods by attacking scale crystals before they reach the formation face. This technique has prevented scaling in some problem wells for more than a year. This new service uses SCP-2, a superior scale-checking compound, which provides longer protection, slower solubility and closer particle size distribution. Compound is a sodium calcium polyphosphate with retarded reversion to orthophosphate, lesser tendency to reprecipitation and temperature stability. Placed in formation in combination with fracturing sand or with oil alone, SCP-2 conditions the water in and around the pay zone to check crystal growth.

Circle No. 349 on Postcard, Page 287

Halliburton FL-2 Fluid Loss Control Additive helps provide increased production from better fractures, does superior job of controlling fracturing fluid loss into permeable zones. Additive can be placed in

Write for this NOW!

"How to use three-phase motors on SINGLE-PHASE CURRENT"

. . . and profit from the added economy and efficiency!

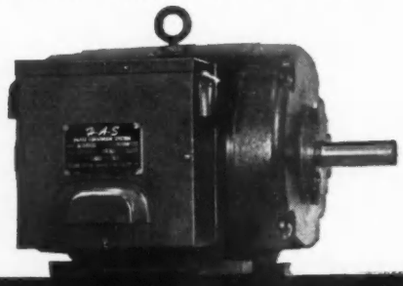
Three-phase motors cost less than single-phase motors, are more efficient, and have far greater salvage value.

The NEW H-A-S Phase Conversion System enables you to use three-phase motors (3 h. p. or larger) on 220 V single-phase current. Three-phase motors cost less, operate for less, and can be used later on three-phase current.

On many rural single-phase lines service is limited to 5 h. p. single-phase motors, but the H-A-S Phase Conversion System permits the use of three-phase motors up to 75 h. p.

The H-A-S is available in two models, for motor mounting and remote mounting.

This is GOOD NEWS in the oil country. To solve an immediate problem —or for your files—write NOW for complete details and the name of your nearest supply store or distributor!



KEN ELLIOTT MOTORS, INC.
P. O. Box 5158-B
BOSSIER CITY, LOUISIANA

H-A-S **PHASE CONVERSION SYSTEM**

any relatively water-free fracturing fluid, making it ideal for use with Sandoil or Vis-O-Frac treatments. FL-2 provides an effective temporary seal-off without appreciably affecting backflow permeability.

Circle No. 350 on Postcard, Page 287

Halliburton R-3 Treating Packer is short, compact, full opening retrievable type packer, designed to be run on tubing into cased hole to isolate section to be treated or produced. Features include: Can be used for treating, fracturing, water flooding, or producing wells; can be set in tension or compression without modification; may be set and reset on one trip in hole or used from well to well; saves rig time; contains safety joint to allow tubing to be removed and packer easily drilled if conditions prevent normal removal; simple tubing manipulation sets packer or re-engages J-slot to unseat packer; permits passage of wireline type tools, instruments or perforating guns; designed to withstand 5,000 psi differential; has Packer Rubber available in different durometer hardness to suit various conditions; design makes redressing and replacement of parts a simple operation.

Circle No. 351 on Postcard, Page 287

Halliburton Retrievable Cup-Type Bridge Plug eliminates need for pump trucks during setting operations and is specially designed for high pressure holes. It may be run in alone on tubing when temporary plug is needed for down-hole treating, or for containing pressure during surface workover operations. It is also run with suitable tool for isolation of zones to be tested, treated or squeezed. Plug's operation is such that setting and retrieving is compatible with operations of RTTS Packer. This combination permits straddling desired zones, so that several may be isolated individually for treating or testing—with only one trip in the hole.

Circle No. 352 on Postcard, Page 287

Halliburton Wire Line Bridge Plug is equipped with upper and lower slips to prevent movement from either direction. Seal element is relatively soft center packer rubber supported on each end with expanding metal shoes which form metal bridge plug mandrel and I.D. of casing when set. Metal bridge prevents rubber from extruding over wedges when subjected to high pressure, and protects rubber from well fluids that might cause deterioration. Wedges and top slip supports are shear pinned to mandrel to prevent premature setting while running in. Junk pusher is made as part of bridge plug. Available in 5½ inch and 7 inch O.D. casing sizes.

Circle No. 353 on Postcard, Page 287

Halliburton Continuous Retrievable Sampler is made up as part of drill string. It provides means of testing while drilling, and of recovering sample of formation fluids amounting to many gallons. Amount of sample recovered can be varied, and because drill string and annulus are always full of drilling mud, night testing may be done in safety. The Sampler body is made up above the drill bit and consists of inflation type packer and valve for inflating it. The assembly consists of a series of barrels under atmospheric conditions with hydraulic actuated test valve to admit formation fluids. Assembly is lowered or raised with sand line. Packer remains in deflated condition while drilling.

Circle No. 354 on Postcard, Page 287

Halliburton FE Acid is designed to help stop plugging action of reddish-brown iron sludge which may precipitate from spent hydrochloric acid. Its application is primarily for treating water disposal and water flood wells where deposits of iron oxides, sulfides and hydroxides from the water have collected on the formation face. FE acid dissolves the iron and keeps it dissolved for longer period, allowing ample time for removal work or easier cleanout operations and lower injection pressures.

Circle No. 355 on Postcard, Page 287

IPE Housing Bureau Will Arrange Living Facilities

Housing facilities for all visitors to the May 14 to 23 International Petroleum Exposition at Tulsa will be available within 30 minutes after arrival.

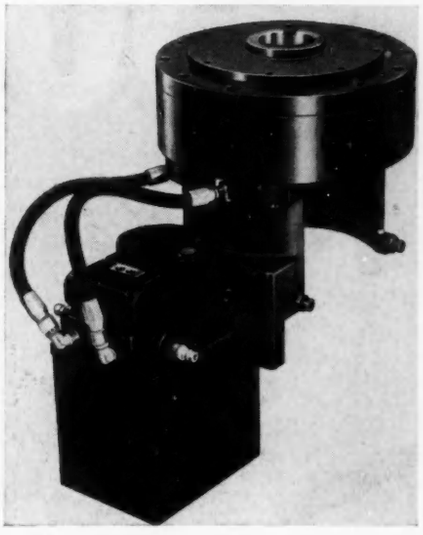
Adequate, comfortable accommodations for the full 10 days or day-to-day basis are available on arrival by contacting Housing Bureau at 514 South Main Street, telephone LUther 5-8118, or housing bureau booths at the Mayo Hotel, Tulsa Hotel, Municipal Airport, Union Depot and bus station.

Advance arrangements may be made by letter or telegram to IPE Housing Bureau, attention S. J. (Steve) Raphel, bureau manager.

The Bellows Company

Booth 4N, North Area

NEW PRODUCTS DISPLAYED:



Bellows-Locke Valve Actuator is a positive control for all types of plug and gate valves. It is offered in two models, air-operated for light duty applications and for use on plug type valves up to 3 inch size—and air-pilot control, hydraulically actuated unit for heavy duty applications in 4, 6, 8, 10 inch plug-type valves.

Circle No. 356 on Postcard, Page 287

Crall Products, Inc.

Booths 50N, 51N

PRODUCTS DISPLAYED:

Crall Spiral Plastic Coated Paraffin Scrapers; Paramount Spiral Polished Rod Clamps; Shux All Purpose Hand Cleaner.

Multi-Color Process Company

Booth 20, Park Lane

PRODUCTS DISPLAYED:

Rubbercals, Decals, etched and baked enamel nameplates.

Fram Corporation

Booth 49, California Building

PRODUCTS DISPLAYED:

Filters for use in filtering lubricating oils and fuel oils; Replacement Cartridges.

F. H. Maloney Company

Booth 14, Texas Bldg.

PRODUCTS DISPLAYED:

Cementing Plugs; Tapping Machines; Crossing Insulators; Casing Seals; Cradles; Thermowells; Pump and Compressor Parts; Pipe Line Spheres; Scraper Plugs.

Adams Pipe Repair Products

Booth 56, Oklahoma Building

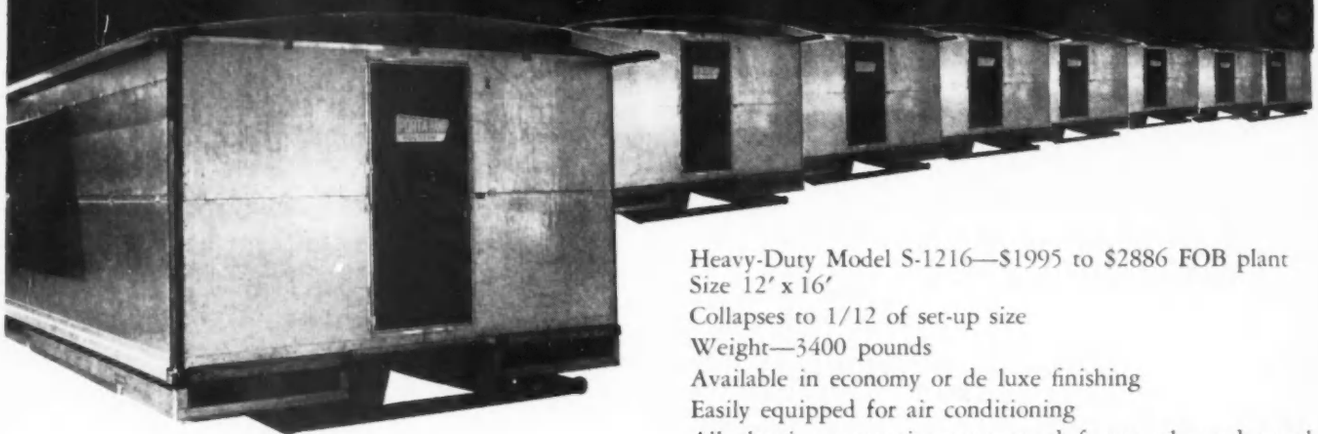
PRODUCTS DISPLAYED:

Pipe Repair Clamps (leak clamps).

Porta-Kamp provides another

50 MAN CAMP

completely equipped for $50,000*



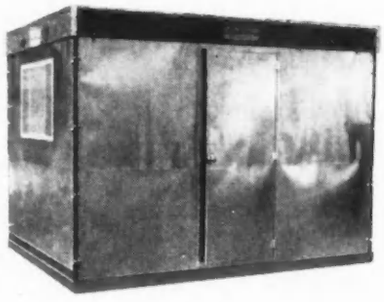
*Cost of completely equipping, crating, and dock-delivering a 50-man camp for shipment to Libya. Included were the new Model S-1216 units, all-electric kitchen, two mess halls, one 8′ x 32′ permanently-erected, steel skid-mounted bath and laundry, cots, mattresses, bedding, kitchen utensils and other required equipment.

This is another example of Porta-Kamp's ability to meet the field housing needs of operators all over the world.

Heavy-Duty Model S-1216—$1995 to $2886 FOB plant Size 12′ x 16′
Collapses to 1/12 of set-up size
Weight—3400 pounds
Available in economy or de luxe finishing
Easily equipped for air conditioning
All aluminum exterior over wood frame, plywood panel interior
Heavy-duty, knock-down construction
Steel skid-mounted
AIR-FLO Roof
New J-LOK ® makes possible a positive wall-to-floor lock, quick set-up and ruggedness
Erected building may be moved intact or knocked down for space saving (available in 8′ x 16′ size)

PLUS—You benefit from an average saving of 80% on shipping costs when you buy Porta-Kamp buildings.

Lightweight Model D-1-C—$585 FOB plant Size 10′ x 10′
• Shipping case size—40″ x 10′ x 14″ • Weight—550 lbs.
• Also available in size 10′ x 20′, model 2D-1-C
• Costs less than tents—let us prove it! • Set up in 15 minutes.



Medium Weight Model K-10—$995 FOB plant Size 8′ x 10′
• Fully insulated • Join several units together
• Available with AIR-FLO Roof
• Weight—950 lbs. • Shipping case size—8′ x 10′ x 15″

*If you are interested in lighter weight, a 50-man fly camp, fully equipped can be purchased and dock-delivered for $15,000. This includes the Model D-1-C units, kitchen, mess hall, cots, mattresses, bedding and all necessary living equipment.

PORTA-KAMP
HOUSTON

Complete camp outfitting • Expert crating and packaging

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P. O. Box 7064, Houston 8, Texas

WHAT'S HAPPENING AMONG MEN IN THE INDUSTRY

Thomas T. Conger

Dwight E. Davis

Standard-Vacuum Oil Company has announced the appointment of **Thomas T. Conger** as the new manager of its Producing department, replacing the retiring **Dwight E. Davis.**

James E. Finch has been named manager of **Sun Oil Company's** Greensburg sales district in the company's Central sales region. The Greensburg district has recently enlarged its operations through a consolidation with the Brownsville sales district. Finch, district sales manager at Brownsville since December, 1957, succeeds **Azel Meadows, Jr.**, who has resigned.

Elard L. Haden, Ponca City, Okla., has been promoted to research engineer in **Continental Oil Company's** production research division.

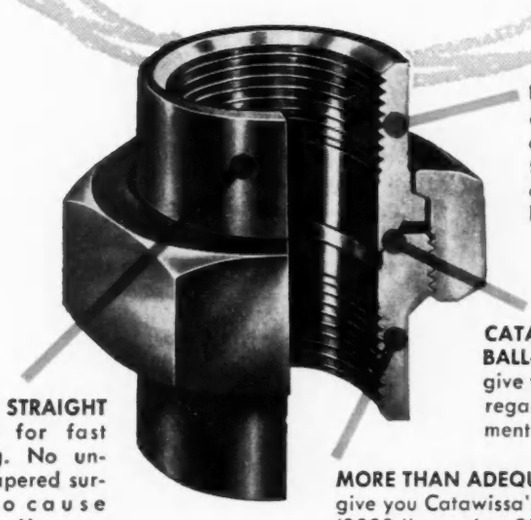
F. O. Griffin has been appointed assistant to **W. C. Norman,** president of **Colorado Oil and Gas Corporation.** Griffin has been vice president and treasurer of Western Nuclear Corporation, uranium mining and milling firms with headquarters at Rawlins, Wyo. He also was formerly manager of the tax department in the Denver and Dallas offices of Arthur Anderson and Company, a national firm of certified public accountants.

F. O. Griffin

Jack O. McCall, first vice president of **The Louisiana Land and Exploration Company,** has been elected a director of the company.

California Research Corporation, research subsidiary of **Standard Oil Company of California,** has announced the appointment of **G. A. Schurman** as manager, Producing Research, Development and Technical Service, at the company's La Habra, Calif., laboratory. In his new assignment Schurman will be responsible for all activities in drilling, well logging, reservoir mechanics and secondary recovery. Schurman is a member of the American Society of Mechanical Engineers, American Institute of Mining and Metallurgical Engineers, Tau Beta Pi and Sigma Xi.

only
CATAWISSA
gives you all these features for your forged steel pipe union requirements



UNIFORM WALLS for even expansion and contraction under temperature changes. THEY FOLLOW THE PIPE!

CATAWISSA BALL-TO-ANGLE SEATS give you a "Perfect Seal" regardless of pipe alignment!

ROUND, STRAIGHT BARRELS for fast wrenching. No uneven or tapered surfaces to cause wrench slips or wrench locking!

MORE THAN ADEQUATE wall thicknesses give you Catawissa's 3-to-1 Safety Factor (3000-lb. service, 9000-lb. test; 6000-lb. service, 18000-lb. test)!

Catawissa Perfect Seal Pipe Unions are made by Union Specialists from 80,000-lb. tensile strength steel (ASTM Spec. A-105-55T, Grade II). Steel forgings from our own forging mill are closely checked for imperfections . . . and finishing on modern, automatic machines with close inspection during and after production give you pipe unions second to none!

Get your free copy of Catalog 56 showing the complete Catawissa line . . . write direct or stop at your favorite supply store.

CATAWISSA VALVE & FITTINGS COMPANY • CATAWISSA, PENNA.

for complete, guaranteed pipe union satisfaction

. . . always specify
CATAWISSA

. . . at your favorite supply store

For more data on advertised products, use Readers' Service Cards, last page.

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International
Petroleum
Exposition
MAY 14-23, 1959
Tulsa, Oklahoma

The Image of CF&I *assures top quality in*

SEAMLESS
CASING AND TUBING

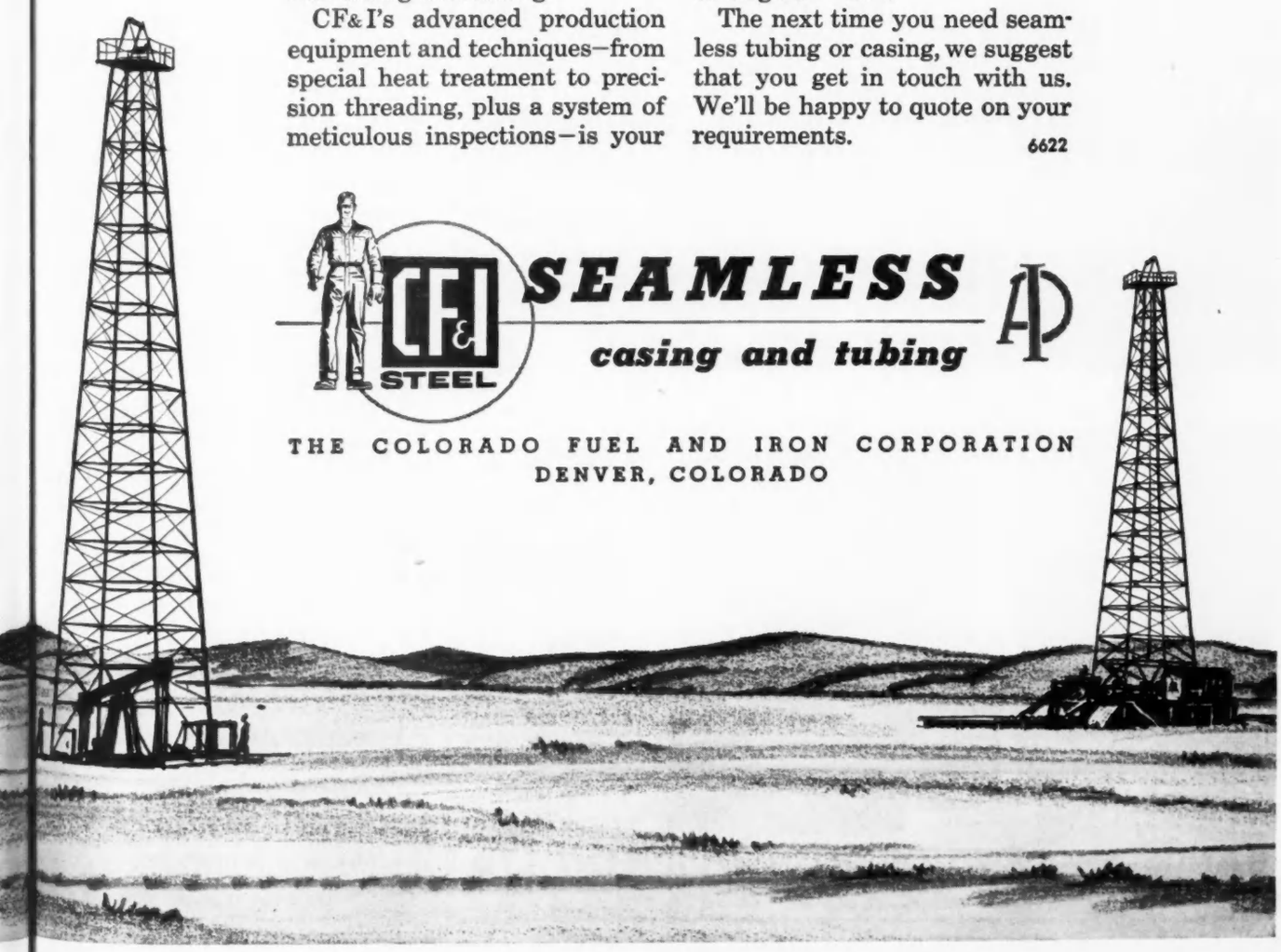
The CF&I giant stands for skill and long years of experience in producing quality steel products. And in the petroleum industry, users have learned to rely on CF&I's craftsmanship for straight, strong and "true" seamless casing and tubing.

CF&I's advanced production equipment and techniques—from special heat treatment to precision threading, plus a system of meticulous inspections—is your guarantee of quality casing and tubing. Made from top quality steel, CF&I Seamless Casing and Tubing are subjected to rigid manufacturing standards and meet API STD 5A specifications. They are available in sizes 2⅜" through 9⅝" O.D.

The next time you need seamless tubing or casing, we suggest that you get in touch with us. We'll be happy to quote on your requirements. 6622

CF&I STEEL **SEAMLESS** *casing and tubing* API

THE COLORADO FUEL AND IRON CORPORATION
DENVER, COLORADO



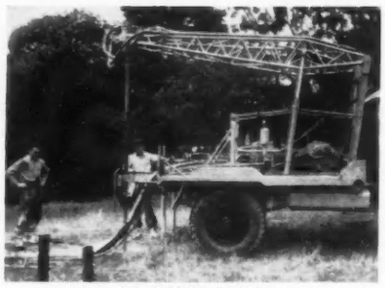
The board of directors of **Petroleum Production Pioneers**, in Los Angeles, has elected the following officers for 1959. Honorary President, **John Cody**, former vice president Superior Oil Co.; Honorary Vice President, **Alex Robertson**, president **Alex Robertson Co.**; President, **O. W. Chonetts**, division engineer, **The Texas Company**; Vice President, **E. (Pick) McIver**, consultant; Treasurer, **Douglas A. Kingman**, manager joint venture operations, **General Petroleum Corporation**; Historian, **Paul Andrews**, chief production engineer, **Signal Oil & Gas Co.**; Sergeant-at-arms, **Floyd Vaughn**, customer contact representative, **Halliburton Oil Well Cementing Company**; Secretary, **Richard Sneddon**, manager Petroleum Club of Los Angeles. New directors introduced at the meeting were **Alex Robertson, E. (Pick) McIver, H. D. Aggers, Union Oil Company; J. R. B. Freeman, Bethlehem Steel Co.; John B. Isaacs, Hillman-Kelley; John O. Hills, General Petroleum Corp.**; and **R. C. Schweitzer, Signal Oil & Gas Company.**

Paul D. Noll has resigned as assistant general superintendent of drilling and production for **Freeport Oil Company**, and has opened a consulting office in the NBC Building in New Orleans. He will specialize in drilling, completion and production engineering problems and lease management.

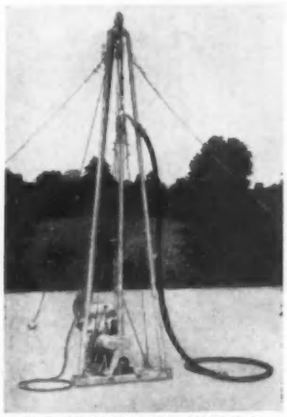
GEOPHYSICAL EQUIPMENT

H-E manufacture a wide range of Geophysical supplies in addition to that illustrated including: loading poles, cable reels, winches, shooting trucks etc. Write for full details quoting ref.D/GL.

H-E TRACTOR DRILLMASTER



H-E TRUCK DRILL



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S. Morton Rutherford, III, of Tulsa, has joined the legal department of **DX-Sunray Oil Company.**

Ambassador Oil Corporation of Fort Worth has formed a consolidated engineering department combining three previously separate departments and has named **Robert H. Vick**, manager of engineering. **J. D. Christner** has been named assistant to Vick and will continue as chief, primary engineer. **Russell Meyers** is senior petroleum engineer in the new department. In his new post, Vick will direct all engineering activities of the company which will include primary and secondary production, drilling, acquisitions, evaluations and gasoline plant operations. Vick was previously chief engineer for secondary recovery.

Robert H. Vick

J. W. Meehan of Wichita, executive vice president and general manager of **Derby Refining Company**, has been elected vice president of the parent company, **Colorado Oil and Gas Corporation** of Denver. Meehan, who joined Derby in August, 1957, continues as president of Derby Oil Purchasing Company and Jayhawk Pipe Line Corporation. Meehan was an executive in the crude oil supply and transportation divisions of The Pure Oil Company of Chicago before joining Derby. At the same time, **Dudley F. Taylor** was appointed to the position of treasurer. Taylor, who joined the company four years ago, had previously been controller. **L. B. Lund**, who has been assistant controller, was appointed controller. Lund has been with the corporation since it was founded in 1952.

William E. McKitrick has been appointed manager of **Shell Oil Company's** Intermountain exploration division with headquarters in Salt Lake City. McKitrick replaces **Galen H. Sturgeon** who has been Shell exploration manager in Salt Lake City since 1953. Sturgeon will assume new duties in Shell's exploration headquarters in Los Angeles. McKitrick will direct the company's exploration program in northern and central Utah, northwestern Colorado, Nevada, southwestern Wyoming and southern Idaho.

Wm. E. McKitrick

B. J. (Bill) Robbins, drilling superintendent for **Barnwell Offshore, Inc.** at New Orleans, was elected a vice president and appointed general manager of the Gulf Coast area at a recent meeting of the board of directors of the company. Robbins, who joined Barnwell Offshore, Inc. about 18 months ago, has had an extensive and varied career in all phases of the drilling industry during the past 20 years, both domestically and overseas.

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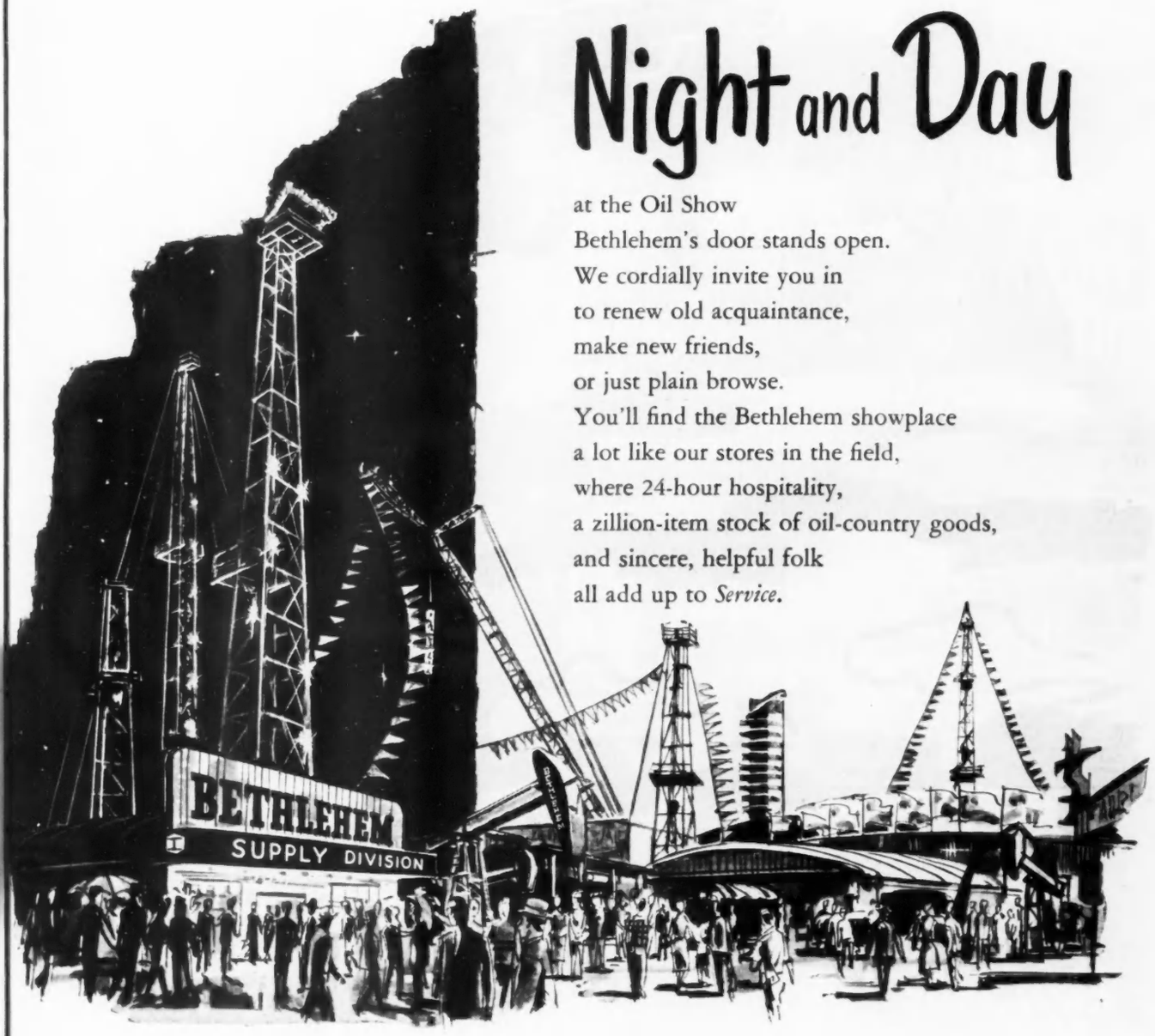

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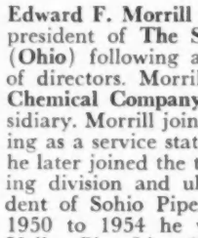
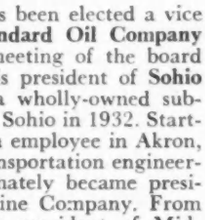
W. C. Kernahan has been appointed manager, Direct Advertising, in the **Gulf Oil Corporation's** Advertising and Sales Promotion department. He succeeds the late **J. A. Burgess.** In his new position, Kernahan will be responsible for planning and executing all direct (industrial) advertising for Gulf. This will involve the advertising of those Company products that are sold to large industrial customers such as the steel, railroad, and manufacturing industries and contractors, fleet operators and the like.

W. C. Kernahan

Edward F. Morrill has been elected a vice president of **The Standard Oil Company (Ohio)** following a meeting of the board of directors. Morrill is president of **Sohio Chemical Company,** a wholly-owned subsidiary. Morrill joined Sohio in 1932. Starting as a service station employee in Akron, he later joined the transportation engineering division and ultimately became president of Sohio Pipe Line Company. From 1950 to 1954 he was president of Mid-Valley Pipe Line Company, in which The Standard Oil Company (Ohio) is a major stockholder. In that post Morrill was responsible for the construction and management of the 1,000-mile big inch crude oil pipe line system reaching from Longview, Texas, to Lima, Ohio. In 1954 Morrill assumed responsibility for the construction of Sohio's petrochemical manufacturing plant at Lima, Ohio. He now heads Sohio's petrochemical operations.



C. H. Calvert



Clinton A. Lueth

C. H. Calvert, Jr., Commonwealth Oil Company production manager since 1956, and **Clinton A. Lueth,** newly appointed exploration manager of the company, have been elected vice presidents of the company.

Socony Mobile Oil Company has announced the creation of two new operating divisions and a reassignment of responsibilities in the company's corporate management. **Mobil Oil Company** will be the newly-formed operating division for the U. S. and Canada. **Herbert Willetts,** a member of Socony Mobil's board of directors, will be president of the division. **Mobil International Oil Company** will be the new operating division for the other countries where Socony operates. **Herman J. Schmidt,** also a director of Socony, will be president of this division. Both Willetts and Schmidt will become executive vice presidents of Socony Mobil.

Signal Oil and Gas Company has named **Loring B. Snedden** chief geologist. Snedden had been with Hancock Oil Company since 1954, when he was appointed chief geologist. The Signal-Hancock merger became effective on December 31. He was president of Intex Oil Company from 1952 to 1954. Prior to that he was associated with The Texas Company for 18 years. He is a member of AAPG and SEG.

O. F. Van Beveren

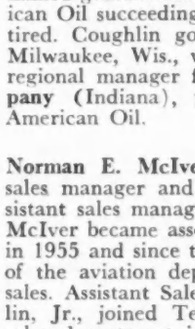
J. P. McCulloch

American Overseas Petroleum Limited has announced the election of **O. F. Van Beveren** as vice president of that company. Van Beveren was formerly director, vice president and general manager of Exploration for Standard Oil Company of California, Western Operations. In his new position he will be in charge of Amoseas exploration programs. Van Beveren succeeds the retiring **J. P. McCulloch.**

C. H. Coughlin has been elected a member of the board of directors of the **American Oil Company.** Coughlin recently was named general manager of sales for American Oil succeeding **J. N. Carney,** who retired. Coughlin goes to New York from Milwaukee, Wis., where he was northern regional manager for **Standard Oil Company** (Indiana), parent company of American Oil.

Norman E. McIver has been appointed sales manager and **Percy Giblin, Jr.,** assistant sales manager of **Texas Gas Corp.** McIver became associated with Texas Gas in 1955 and since then has been in charge of the aviation department and active in sales. Assistant Sales Manager Percy Giblin, Jr., joined Texas Gas Corporation's sales department in 1956. Prior to that, he was a loan adjuster with an investment company.

A. Hamilton (Ham) Mencher has resigned as Field Editor of the **Rocky Mountain Oil Reporter** after covering oil exploration, drilling and production activities in that area for the past four years. From offices in the Empire Building, Denver, Mencher plans to offer editorial, information and advertising services for and to the oil industry. Prior to joining the Oil Reporter, Mencher spent several years in Northwestern New Mexico's San Juan Basin. A portion of this period was with an oil field service company, the remainder in drilling and production supervision.



A. Hamilton Mencher

C. E. Davis

E. V. Murphree

30 Nations to Take Part In World Petroleum Congress

The Fifth World Petroleum Congress will be held at the Coliseum in New York City, May 30 through June 6, commemorating the centennial anniversary of the discovery of oil in Pennsylvania, at the Drake Well in 1859. The Congress will include a symposium of the utilization of nuclear energy in the oil industry.

C. Eugene Davis, recently retired vice president of Shell Oil Company and now a consultant, is general secretary of the Congress. Thirty nations are expected to be represented by more than 5,000 oil scientists and other visitors. **Edgar V. Murphree,** president of Esso Research and Engineering Company, currently on one-year leave of absence while serving as Special Assistant to the Secretary of Defense heading U. S. guided missiles program, is chairman of the Congress' top governing group. Murphree was re-elected to this post during the Fourth World Petroleum Congress at Rome, Italy, in 1955.

Between 70 and 80 technical sessions are expected to take place. They are to be divided into the following nine sections: geology and geophysics; drilling and production; oil processes and refining; chemicals from petroleum products; composition, analysis, and testing; utilization of petroleum products; engineering, equipment, and materials; transportation, distribution, marketing; and operations research, statistics, and education. About 200 technical papers are expected to be presented.

C. H. Swanson, formerly sales manager of LPG production for Anchor Petroleum Co., Tulsa, has been named manager of domestic purchases and sales for **Wanda Petroleum Co.,** Houston.

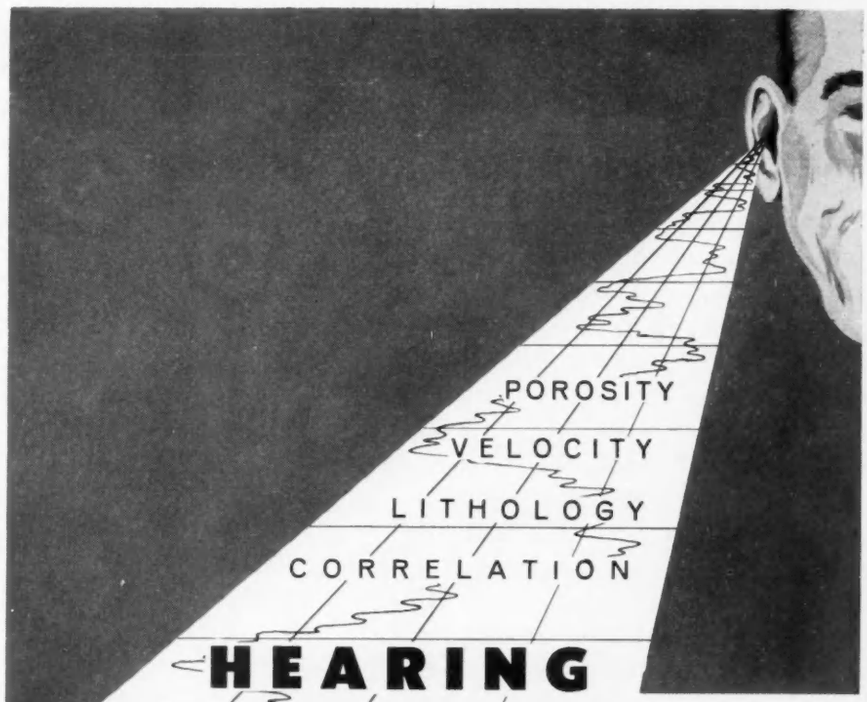
O. N. Miller has recently been elected to the board of directors of **Standard Oil Company of California** to succeed the retiring **E. J. McClanahan.** Miller, who received his Ph.D. in chemical engineering at the University of Michigan, joined Standard in 1934 and has held a variety of positions in the Company's research and refining operations. He became a vice president in 1954. McClanahan went to work for Standard in 1912. He has served as president and chairman of Standard Oil Company, Western Operations, Inc. He also has seen service in many Pacific Coast cities and in Alaska and Honolulu. His retirement was effective March 31, after 47 years of service.

O. N. Miller

James A. Wallace has been made chief geologist of the **Arabian American Oil Company.** Wallace succeeds the late **Richard A. Bramkamp** and will make his headquarters in Dhahran, Saudi Arabia. In his new position, Wallace is on loan to Aramco from **Socony Mobil Oil Company, Inc.** Wallace joined Mobil Oil Company of Canada in 1944 as a field assistant. In 1951 he was appointed Mobil's regional geologist for Western Canada. Later he became the Company's staff geologist for Saskatchewan and district geologist for Central Alberta. At the same time, Aramco announced that **O. A. Seager,** who has been serving for the past two years as manager of the Exploration and Producing department in New York, is returning to Dhahran to resume his previous post as manager, Oil Operations, and that **Donald M. Brown,** who has been manager, Oil Operations, in Dhahran, is returning to New York to his former position as manager of the Exploration and Producing department.

James A. Wallace

Scott L. Harrington has been elected an assistant secretary of **Reserve Oil and Gas Company.** Harrington was formerly associated with the company's general counsel, Messrs. Morrison, Foerster, Holloway, Shuman & Clark. He is a member of the State Bar of California, American Bar Association, San Francisco Bar Association.



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what's Happening

among INDUSTRY ASSOCIATIONS

Los Angeles NOMADS Host International Guests

International guests at the recent March 11 meeting of the Los Angeles Chapter of Nomads. Left to right (standing) Lon Whitson of Iran Oil Co. from Iran; C. E. Batien of Qatar Petroleum Co. from Qatar; Walt Munger of Bolsa Chica from Turkey; C. W. Maupin of Bolsa Chica from Turkey; Hugh D. O'Neil of Aramco from Arabia; Gottfried Wilke of Gew. Brigitta from West Germany; Fred Peveto of I.P.C. from Iraq; T. D. Parnell of Loffland Bros. from Colombia; R. H. Deem of D & E from Colombia; Jack Rice of Drilexco from Brazil; Lester R. Rojas of Haney & Williams from Uruguay; Charlie Spannagel of Baker Transworld from Venezuela; W. C. Lance of Santa Fe Drilling from Burma; (seated) Jose Owens of Empresa Nac. del Petroleo from Chile; Satoru Sasaki of Teikoku Oil Co. from Japan; Stsuji Urai of Teikoku from Japan; Joe H. Davis of Haney & Williams from Brazil; J. M. Watson of Haney & Williams from Brazil; E. M. Morrison of Haney & Williams from Brazil; M. Yui of Teikoku from Japan; Glenn N. Murchey, independent consultant from Venezuela.

SEG Annouces Scholarships At Recent AAPG Convention

Frank Goldstone, chairman of the trustees for the Society of Exploration Geophysicists foundation, has announced that more than $19,000 in exploration science scholarships are being offered by the SEG for the 1959-60 school year. He said 17 oil exploration companies are sponsoring 20 individual grants totaling $18,000 and 16 individuals and companies had contributed an additional $1,000 to the foundation's general fund for education and research.

Goldstone advised interested students to write to the SEG, Box 1536, Tulsa 1, Oklahoma.

New Officers Are Elected By Southern District API

Election of new district officers highlighted the activities of the American Petroleum Institute Division of Production's Southern District meeting at New Orleans recently.

Nearly 1,000 oilmen in attendance from Louisiana, Arkansas, Mississippi, east Texas and the Gulf Coast also heard 13 technical presentations on drilling and production matters at group sessions on

Canadian Petroleum Association 1959 Board of Governors

At the Annual Meeting of the Canadian Petroleum Association held recently in the Hotel Palliser in Calgary, the results of balloting for the 1959 Board of Governors was announced and the newly elected governors then choose their executive. From left to right (front row): J. S. Black, South Saskatchewan Pipe Line Company, E. C. Babson, Union Oil Company of California, chairman; R. A. Cruickshank, Canadian Devonian Petroleum Ltd., and C. E. Leach, Tidewater Oil Company, first vice-chairman. Back row (left to right): W. C. Howells, Texaco Canada Ltd.; W. D. C. Mackenzie, Imperial Oil Limited; A. F. Beck, Canadian Export Gas & Oil Ltd.; J. B. Webb, Canadian Oil Companies, Limited; V. Hunter, Imperial Oil Limited; D. M. Tyerman, MacPherson, Leslie & Tyerman; A. O. Detmar, Mobil Oil of Canada, Ltd., second vice-chairman; C. S. Lee, Western Decalta Petroleums Ltd., and C. O. Nickle, Conick Petroleums Ltd.

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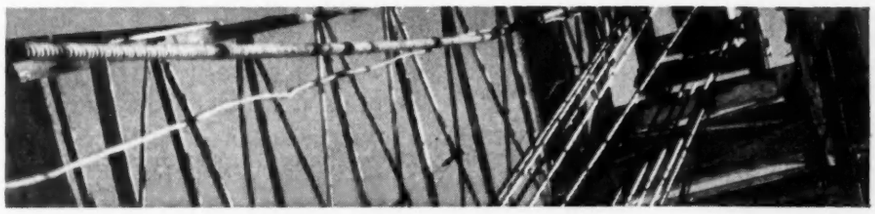

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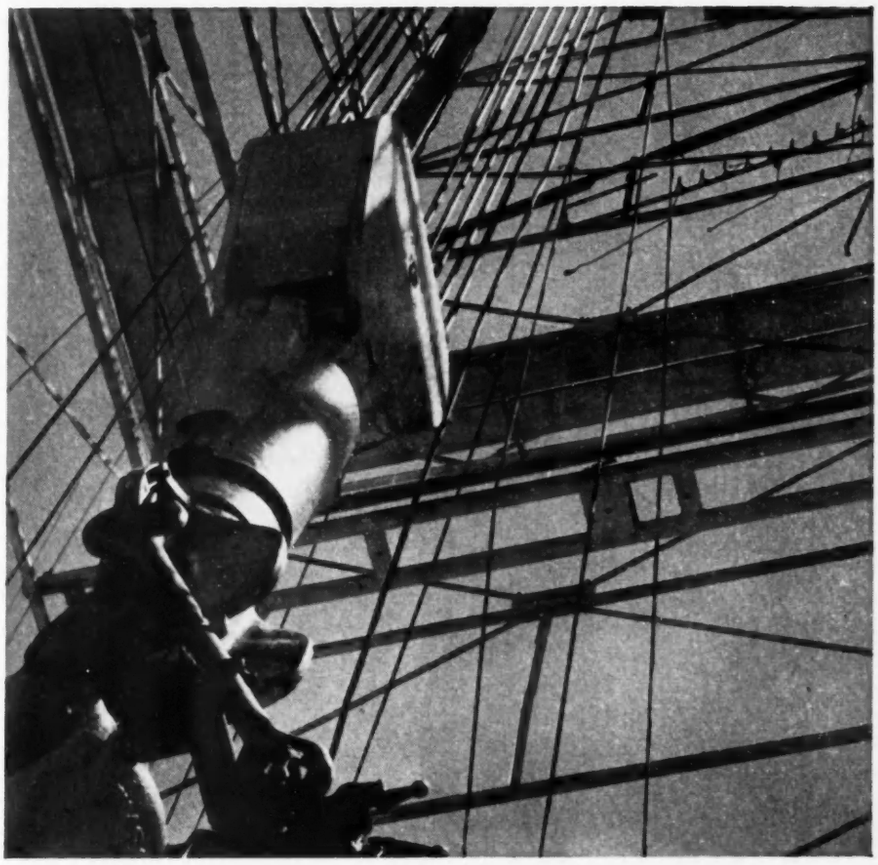

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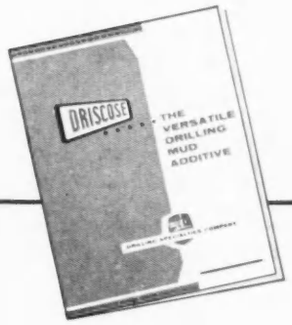

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the final day's program.

Newly-elected chairman for 1959 which marks the 100th anniversary of the petroleum industry dating from the Drake well will be Albert L. Vitter, Jr., The California Co., New Orleans.

Vitter succeeds Roy A. Bobo, Phillips Petroleum Co., Houston, who was elected chairman of the District Advisory Committee. R. A. Buschman, Field Drilling Co., San Antonio, was named secretary-treasurer.

District vice-chairmen elected and their areas were: Walter Kalteyer, Hunt Drilling Co., Corpus Christi, southwest Texas; Carl A. Kinney, Atlantic Refining Co., Lafayette, southwest Louisiana; Jack Robbins, Skinner Corp., San Antonio, Balcones area; Paul Clinkenbeard, Dowell division of Dow Chemical Co., Shreveport, Ark-La-Tex area; W. J. Green, Reed Roller Bit Co., Houma, southern Lauisiana.

Also, J. C. Brown, Sun Oil Co., Sullivan City, Texas, Rio Grande Valley area; Thomas Pennington, Humble Oil & Refining Co., Houston, Texas-Gulf Coast; Earl White, Mustang Drilling Corp., Tyler, east Texas; and J. J. Harper, Lane-Wells Co., Victoria, south central Texas.

API Southwestern District Elects L. L. McDonald Chairman

The American Petroleum Institute's Southwestern District has elected L. L. McDonald, Pure Oil Company, Fort Worth, as chairman, to serve until the 1960 meeting of the district. Elected with McDonald were Ellsworth Showen, Gulf Oil Corporation, Midland, Texas, chairman of the district advisory committee, and Clancy Olson, Dowell, Incorporated, Dallas, as district secretary-treasurer.

Included in the 1959-1960 officers for the district were: for vice chairman for West Texas, Pat Fletcher, Atlantic Refining Co., Midland; for vice chairman for Southeast New Mexico, Guy Baber, National Supply Company, Hobbs; for vice chairman for North Central Texas, W. C. Werner, Humble Oil and Refining Company, Wichita Falls; for vice chairman for Northwest New Mexico, Ewell Walsh, El Paso Natural Gas Products Co., Farmington; for vice chairman for the South Plains, Luther Reynolds, Pan American Production Corp., Brownfield; and for vice chairman for Northeast Texas, John P. Holle, Sinclair Oil & Gas Company, Gainesville.

Helen Tappan

Alfred R. Loeblich, Jr.

Dr. Patrick H. Monaghan

Henry B. Stenzel

SEPM Presents Awards for Best Papers at Recent Meeting

Recipients of awards for the best paper in the Journal of Paleontology and the Journal of Sedimentary Petrology for 1957 are Alfred R. Loeblich Jr., and Helen Tappan (Mrs. Alfred R. Loeblich Jr.) for their paper entitled: "Correlation of the Gulf and Atlantic Coastal Plain Paleocene and Lower Eocene Formations by Means of Planktonic Foraminifera." Loeblich is senior research paleontologist for the California Research Corporation at La Habra, Calif. Mrs. Loeblich (who publishes under the name of Helen Tappan) is a lecturer in geology at the University of California at Los Angeles. They received certificates at the 1959 convention of SEPM at Dallas.

Dr. Patrick H. Monaghan's paper: "The Solubility of $CaCO_3$ in Salt Water" has been selected as the best paper presented at the 1958 meeting of the Society of Economic Paleontologists and Mineralogists held in Los Angeles. Dr. Monaghan is senior research engineer, production research division, Humble Oil & Refining Co., Houston.

Henry B. Stenzel, consultant for Shell Oil Co., Houston, was elected an honorary member of SEPM. Stenzel is a former president and secretary-treasurer of the society. He was presented the honorary membership certificate at the March meeting.

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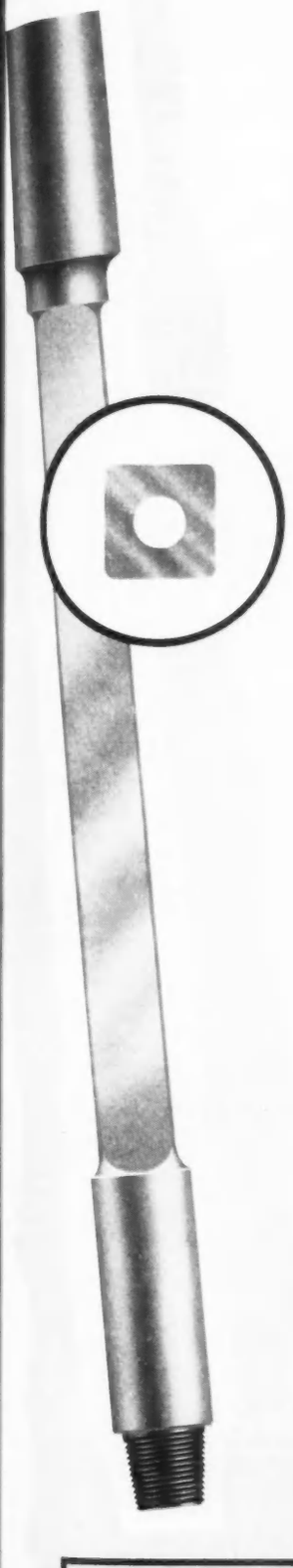
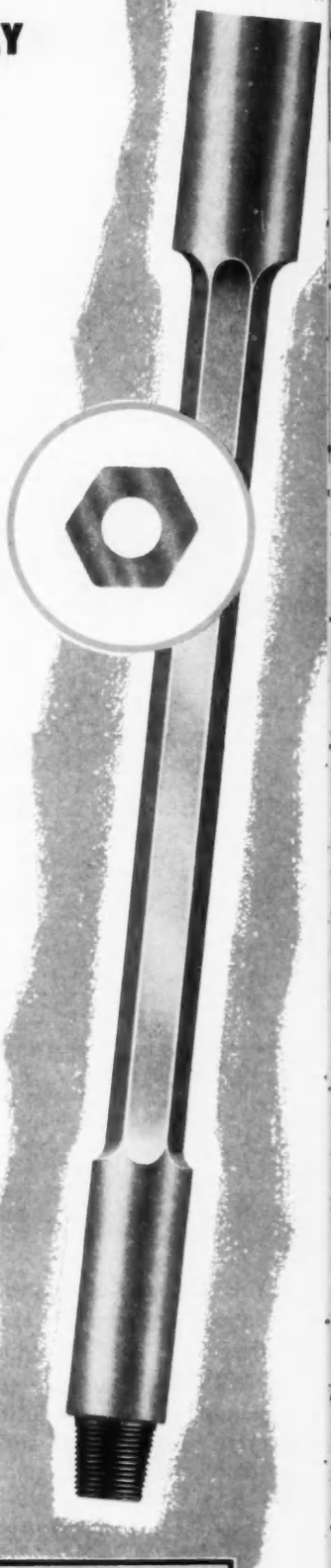
Square or Hexagonal Kelly...





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- Stronger in torque*
- Greater tensile strength*

*Based on comparable square and hex kellys.

Facilities are available in the United States for reconditioning worn hex or square kellys, and for stubbing by the Baash-Ross pressure weld method.

PROTECT your kelly investment — use Baash-Ross Kelly Drive Bushings.

BAASH-ROSS DIVISION
OF JOY MANUFACTURING COMPANY
GENERAL OFFICES: 5306 CLINTON DRIVE, HOUSTON, TEXAS

AREA OFFICES:
Houston, Texas, Odessa, Texas, Dallas, Texas; Long Beach, Cal.; Casper, Wyoming; Oklahoma City, Okla.; Olney, Ill.; Calgary, Alberta, Canada; New York, N. Y.

FOREIGN OFFICES:
Monte Carlo, Monaco; Mexico City, Mexico; Greenock, Scotland; London, England; Paris, France; Caracas, Venezuela; Buenos Aires, Argentina; Rio de Janeiro, Brazil; Tokyo, Japan

BAASH ROSS DIV JOY

BOOKS

PETROLEUM REVIEW, GARZA and LYNN COUNTIES, TEXAS, Phifer Petroleum Publications, P. O. Box 20,-024, Houston, Texas, Robert L. Phifer, $15.

This is No. 14 in the series of Petroleum Reviews that now covers 19 counties of West Texas and New Mexico. It was compiled by Robert L. Phifer from the records and hearing files of the Railroad Commission of Texas. Although the two counties are included in the same book, a separate section is devoted to each.

The new 119-page book outlines the discovery, development, and production of 62 oil fields that have been discovered in the counties since 1926. There are 47 illustrations, including structure maps of many of the fields used as exhibits at Commission hearings, logs of most of the discovery wells, and a map of the two counties with the fields in color.

Information in the book is complete through November 1 and production for the current year for each field, January through June, is also listed.

HANDBOOK OF THE PETROLEUM INDUSTRY, George Newnes Limited, Tower House, Southampton Street, Strand, W.C.2, London, England, G. Sell, 25s, Od. net.

This book provides a background of information for young people considering a career in the petroleum industry and for those already employed "in oil."

Not designed as a textbook on petroleum, this book provides instead a wealth of information on many facets of the petroleum industry. The contents will be of interest to anyone engaged in the search for petroleum, its production, transport and subsequent conversion into marketable products.

OKLAHOMA GEOLOGICAL SURVEY, Semi-Centennial Report, Norman, Okla., $2.

The report summarizes the activities of the Survey in its first 50 years.

The Survey furnishes scientific and technical information about Oklahoma's mineral deposits and ground water, among other things.

TRANSACTIONS OF SHORT COURSE AND CONFERENCE ON AUTOMATION AND COMPUTERS, Volumes I and II, The University of Texas, College of Engineering Petroleum Engineers, Austin, Texas.

Sponsored jointly by the College of Engineering and The Society of Petroleum Engineers as their contribution to The University of Texas' 75th year anniversary observance, the transactions are a compilation of the recent short course and conference on automation and computers, held at The University of Texas on June 2, 3 and 4, 1958.

Volume I includes programming a digital process control computer for system reliability, the digital computation mission in the missile development field, the digital computer in engineering education, flow and storage of material, from problem to solution, automation in missile systems, a flight data system, automatic flight control, the role of the small computer in industrial research, application of computers to well logging problems, financial justification for automation, introduction to the steel rolling process, electro-acoustical analog for pulsation suppression and control in gas compression stations, application of an automatic data handling system to an aircraft company's testing division, frontiers of computer application, and digital computer programming—a must for the modern designer.

Volume II contains information pertaining to a review of automation, a perspective view of analog computers, logical aspects and sidelights in computation, the use of a computer as a research tool, digital computer functions in numerical control, use of computers in process research, analog computers—wheelhorses of automation, and what is automatic programming?

HANDBOOK OF CALCULUS, DIFFERENCE AND DIFFERENTIAL EQUATIONS. Prentice-Hall, Inc., Englewood Cliffs, N. J., Edward J. Cogan, Sarah Lawrence College, and Robert Z. Norman, Dartmouth College.

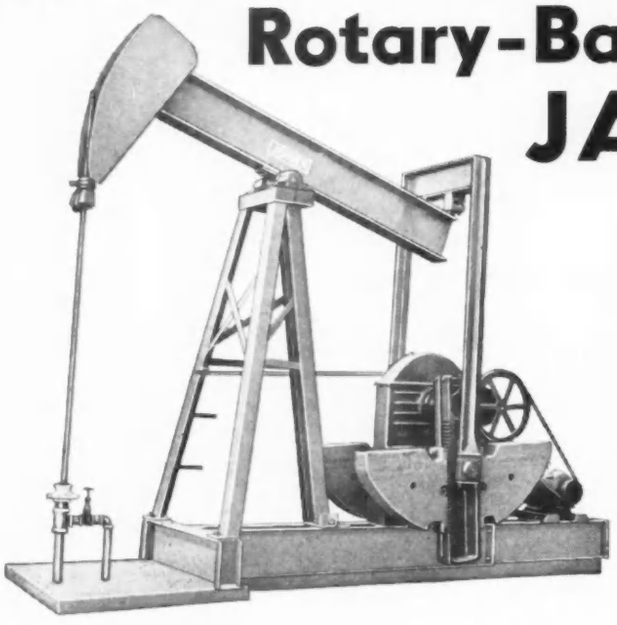
This Handbook offers to the student of calculus and differential equations a review of properties of often-used functions as well as table values of the more common transcendental functions and a table of integrals.

The key feature of this Handbook is its table for the solution of differential equations. To solve an elementary differential equation, the first step is to classify it so as to determine what technique to apply; the second step is to apply the indicated technique. This Handbook does just that.

It pays to specify

JENSEN

Rotary-Balanced JACKS



See the **JENSEN** Rotary Jack on exhibit Booth 21, Kansas Bldg.

OIL SHOW Tulsa, May 14-23

You eliminate expensive special foundations and crank weight wells with the new JENSEN Rotary-Balanced JACK. Its floor-clearing cranks and weights permit installation on flat concrete surfaces or on simple steel substructures.

One-man rack-and-pinion counterbalance adjustments, larger samson posts, larger and heavier shafts and bearings—are additional reasons why it pays to specify JENSEN R-B JACKS. Get *all* the facts and figures before you equip your next well—a call or card will bring it to you *fast!*

STOCKED BY YOUR LOCAL SUPPLY STORE

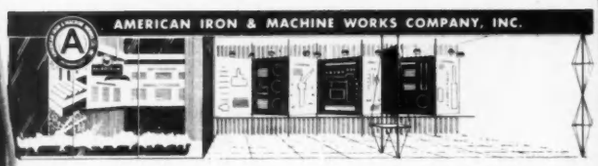
Made by JENSON BROS. MFG. CO., INC., P. O. Box 477-D, Coffeyville, Kan.

Export Office: 250 Park Avenue, New York 17, N. Y. U.S.A.

JENSEN JACKS

"See you in TULSA!"

AMERICAN IRON & MACHINE WORKS CO., INC.
MANUFACTURERS OF OIL FIELD EQUIPMENT
A
OKLAHOMA CITY



M. G. "Mac" McCool

Elmer Rubac

Bert Wheeler

We, and all the sales force at American Iron, are looking forward to seeing you at the great International Petroleum Exposition in Tulsa.

As in years past, American Iron will have an unusual, colorful exhibit of our quality drilling and producing equipment, including many new products! In addition, for your comfort, we will have an air-conditioned lounge in our booth area.

Stop by and say "Hello," we'll all be happy to see you!

Booth No. 159-60-61 Oklahoma Building

Another AMF Product
PETROLEUM EQUIPMENT

Available through your Supply Store

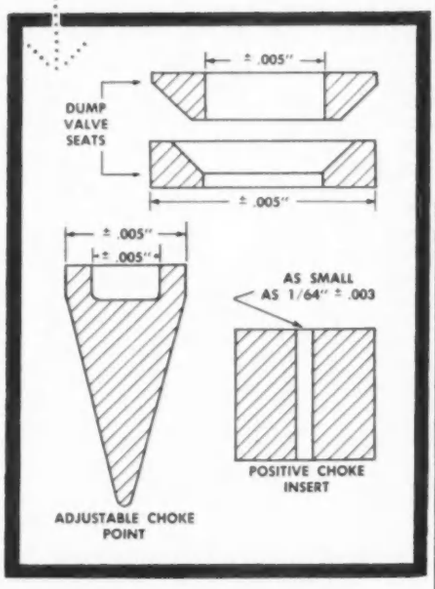
AMERICAN IRON & MACHINE WORKS COMPANY, INC.
518 North Indiana Avenue • Oklahoma City, Oklahoma
Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

36 Years' Experience in Designing and Manufacturing Oil Field Equipment.

AMERICAN IRON & MACHINE WORKS CO., INC.
MANUFACTURERS OF OIL FIELD EQUIPMENT
A
OKLAHOMA CITY

WEAR IS WASTE!

Here's How CMC Hard-Trim Can Trim Your Operating Costs



Impingement of abrasive oil and gas flow on control valves and orifices causes rapid wear, frequent lost production for maintenance and repair. A few dollars invested in precision-cast tungsten carbide hard-trims for these troublesome wear spots can save you hundreds or thousands in down-time.

CMC Tungsten Carbide Castings are not to be confused with conventional hard-facing materials or sintered carbides. They are *cast* to extremely close tolerances and provide a density and wear resistance not available in other materials.

Special Facilities for Tungsten Carbide Research

WRITE TODAY FOR COMPLETE DETAILS AND LIST OF HARD-TRIM SUPPLIERS

CARBIDE MANUFACTURING COMPANY, Inc.

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101

What's Happening among SERVICE and SUPPLY MEN

S. L. Brown, Jr.

J. G. Hudson

J. D. Browning

L. E. Luthy

Cleco Air Tools, a division of **Reed Roller Bit Company,** has announced four new appointments in that firm's sales department. **S. L. Brown, Jr.,** formerly assistant to the sales manager, has been named manager of general sales office; **J. G. Hudson,** former salesman, is now assistant to the sales manager; **J. D. Browning** has been named senior salesman of the Houston territory, and **L. E. Luthy,** formerly with the Remington Rand Corporation, has joined Cleco as a salesman in the Houston area.

J. M. Gruitch has been appointed to the newly created post of director of government products for **ACF Industries, Incorporated** has been announced. He formerly held the position of director of defense products for ACF's American Car and Foundry division. Gruitch will be responsible for coordinating all government product marketing activities for the company's six operating divisions, whose products encompass aircraft and missile components, electronic and electro-mechanical systems and heavy ordnance.

Dr. Charles E. Reed has been named general manager of **General Electric Company's** Metallurgical Products department in Detroit. He succeeds Kenneth E. Beardslee who has become a consultant for the department.

Cummins Engine Company, Inc. has announced the election of **Seymour Dribben** to the board of directors of that firm. Dribben is vice president of Chemical Corn Exchange Bank, New York.

Dr. George R. Gray has rejoined **Baroid Division National Lead Company** as assistant manager, Drilling Mud department after a year's absence.

Continental-Emsco Company announced the following appointments and transfers of store managers: **William E. Lasseter,** Oklahoma City; **L. Z. Bolding,** Liberal, Kan.; **James C. Ellis,** Morgan City, La.; **James W. Dees,** Houma, La.; **Ray J. Opsal,** Glendive, Mont.; **Owen L. Stone,** Williston, N. D.

Marc D. Gilbert, former district manager in Kansas City, Mo., for **Rockwell Manufacturing Company,** has been promoted to assistant regional manager of the company's meter and valve division and has been transferred to Tulsa. **James H. Sells** has been named to succeed Gilbert in Kansas City.

E. W. Morehead, salesman with the San Francisco sales office of **Bethlehem Pacific's Supply Division** for the past eight years, has recently been appointed resident sales manager. He succeeds **W. H. Weitzel** who has retired. Morehead began in the pipe, valve and fitting supply business in 1929. He joined the Petroleum Equipment Company in 1942 before it was acquired by Bethlehem Pacific. In 1944 he was transferred to the company's San Francisco office and in 1950 was appointed salesman.

E. W. Morehead

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has announced several changes in that organizations operations. **Malcolm S. Jones,** sales representative in the Denver district since 1951, has been named manager of the El Paso district Allis-Chalmers Group. **Bruce C. Halstead** has been appointed manager of the Richmond, Va., district succeeding **J. M. Mathews** who resigned. **Stanley S. Scott** has been assigned as a sales representative to the Houston district.

M. L. Mandeville has been named vice president and director of sales of the **International Division of U. S. Industries, Inc.** In his new capacity, Mandeville will organize and direct the sales program for this USI division which specializes in the world-wide exporting of heavy machinery and equipment made by other USI divisions as well as leading American and foreign manufacturers.

M. L. Mandeville

ALUMINUM RIB STABILIZER FOR DRILL COLLARS

RUGGED!

Nothing describes DRILCO'S newest tool for drilling straighter holes quite so well as RUGGED!

It's DRILCO'S exclusive non-rotating *Aluminum Rib* Stabilizer for Drill Collars.

Introduced by Drilco to the oil industry six months ago, the *Aluminum Rib* Stabilizer is providing several times longer life than previous sleeve type stabilizers run in shale, anhydrite, salt, conglomerates or other softer unconsolidated formations.

Drilco's safety features on non-rotating sleeve type stabilizers - - - safety clutch to hold sleeve stationary during "washover"; free vertical travel of sleeve to act as a "jar", and drillable ribs - - - all are included in the design of the *Aluminum Rib* Stabilizer.

When you have a crooked hole problem, think FIRST of DRILCO —the leader in straight hole tools. Contact your Drilco representative TODAY.

Drill Collar Stabilizers—Rotary Reamers—Drill Collars—Subs—Drill Collar Torque Indicators

DRILCO OIL TOOLS INC.

Drawer 3135 Midland, Texas

Representatives in:

CANADA
Calgary CH 9-6551
Edmonton 6-67562

COLORADO
Cortez LO 5-8626

KANSAS
Liberal MA 4-4412
Hutchinson MO 3-3376

MISSISSIPPI
Brookhaven 2772

LOUISIANA
Shreveport 2-8502
Lafayette CE 4-9621
New Orleans FO 6-3029

NEW MEXICO
Hobbs EX 3-4382
Farmington DA 5-0571

OKLAHOMA
Oklahoma City CE 2-9704

TEXAS
Snyder HI 3-6386
Graham LI 9-1944
Houston WA 6-6325
Odessa FE 2-2041
Midland MU 2-5238

WYOMING
Casper 2-7139

Transmitting

From its office in Gainesville, the Georgia Gas Company controls an Ingersoll-Rand SVG gas-engine compressor 15 miles away by microwave signals. This control panel indicates operating conditions, and contains con-

trols which are linked by the microwave transmitter (at its left) to a receiver and control panel at the compressor station 15 miles away (see opposite page).

Ingersoll-Rand

6-R94

S. S. Roszel, Jr.

Lee Thomas

S. S. Roszel, Jr., has been named general sales manager of **Eastman Oil Well Survey Company.** Roszel was formerly assistant general sales manager. **Lee Thomas** has been promoted from Mid-Continent division sales manager to division sales manager of the Southern Division of the Eastman company. Roszel will make his headquarters in Denver, the company's headquarters. Thomas will have his office in Houston.

Ben Hilliard is the new division sales manager for the Gulf Coast and Export Sales of **Web Wilson Oil Tools, Inc.** He will operate from headquarters in Houston. **Ray Gorman,** division sales manager for the Mid-Continent, will assume the added responsibility for the Rocky Mountain and Canadian Territories. **Merrick Phelps** continues as the Web Wilson sales representative for East Texas, Houston and the Texas Gulf Coast.

T. J. Walne has recently been appointed assistant manager of the **International Division of Cameron Iron Works, Inc.** In his new position Walne will assist **J. H. Grubb,** manager of Cameron's International Division. Walne will assist Grubb in all phases of the company's operations outside the United States. Walne has been associated with the oil industry on an international basis for a number of years. His appointment was effective immediately and will be located at the general offices of Cameron in Houston.

T. J. Walne

Kenneth Harlow, on the engineering staff of **Jetwell, Inc.,** Tulsa based wireline servicing company specializing in perforating and logging, has been named sales engineer at the firm's Great Bend, Kans., station.

Odex Engineering Company, Odessa, Texas, has announced several changes in the organization. **Berkeley Dynamics,** Berkeley, Calif., has been named Odex's West Coast sales and service representatives. **Ben Franklin,** former sales engineer of the Odessa office has moved to Gretna, La. He will assume duties there as division manager for southern Louisiana. **Tom Sherril,** also sales engineer in the Odessa area, has been promoted to manager over the Oklahoma division. He has made the move to Oklahoma City. **Bob Dozier,** formerly with Sivalls Tank Company and J & J Steel & Supply Company, has joined the Odessa staff as sales engineer.

BJ Service, Inc., has announced a number of promotions and transfers. Former Mid-Continent Division Sales Supervisor **Herb Alexander** has been transferred to BJ headquarters at Long Beach, Calif., as executive assistant. **J. C. Jackson** previously district superintendent at Guymon, Okla., replaces Alexander at the Tulsa office. **Floyd Long** moves to Guymon from Wichita, Kan., as district superintendent; **Jack French** from Pampa to Borger, Texas, as district superintendent; **Bob Tull** from Guymon to Pampa as sales representative and **Charlie Mohr** from Breckenridge, Texas, to Houston as division engineer.

A. J. Olson

P. M. Davis

Continental-Emsco Company has announced the recent promotions of **A. J. Olson** to the position of chief application engineer, Houston; **P. M. Davis** to sales engineer, Drilling Structure-Masts; and **C. W. Gwaltney** as senior design engineer. Olson, formerly chief engineer, sales distribution division, joined C-E in 1927. He will headquarter in Houston at the C-E plant. Davis joined C-E in 1953 and previously held the position of Mast Sales Specialist. He will work out of the Dallas general offices of the company. Gwaltney will headquarter at the company's newly expanded Houston manufacturing plant.

C. W. Gwaltney

Jack T. Dilke has been appointed sales representative for **Leschen Wire Rope Division, H. K. Porter Company, Inc.,** according to a recent announcement. His territory covers central and western California, Nevada, Utah and southeastern Idaho.

J. Stanley Roberts, secretary-treasurer of **Wilson Supply Company and Wilson Foundry & Machine Company** has been elected to the advisory board of the **North Side State Bank of Houston.**

Jones & Laughlin Supply Division has announced the appointment of six new salesmen in their field sales force. These men are graduates of the division's sales training program. **Jack H. Rankin** is assigned as salesman at Kermit, Texas; **John W. Snyder** is assigned as salesman at Alice, Texas; **Gordon N. Jones** is assigned to the Williston, N. D., store as a salesman; **Gary N. Griffiths** is assigned as salesman at Odessa, Texas; **Larry F. Ransdell** is assigned as salesman at J&L's Oklahoma City sales office; **Jerre B. Williams** is assigned as salesman at El Dorado, Arkansas.

The IR gas-engine compressors that "THINK FOR THEMSELVES" also respond to

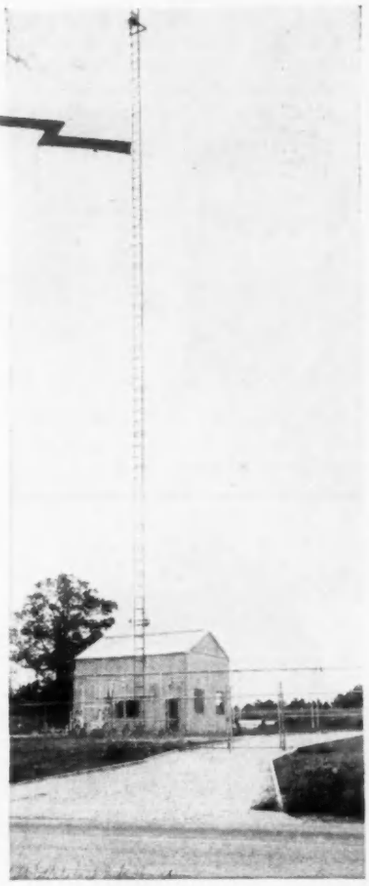
"TELEPATHY"

...Georgia Gas Company's new booster station is controlled by microwave from 15 miles away

At Georgia Gas Company's office in downtown Gainesville, a man turns a knob on a control panel and a radio signal is beamed from a tower outside the building. Fifteen miles away, a 440-hp Ingersoll-Rand SVG gas-engine compressor plant starts itself, brings itself up to speed, and puts itself on stream delivering gas to Georgia homes and businesses. All the time it is running, the unit is monitoring its own operation and protecting itself from harm.

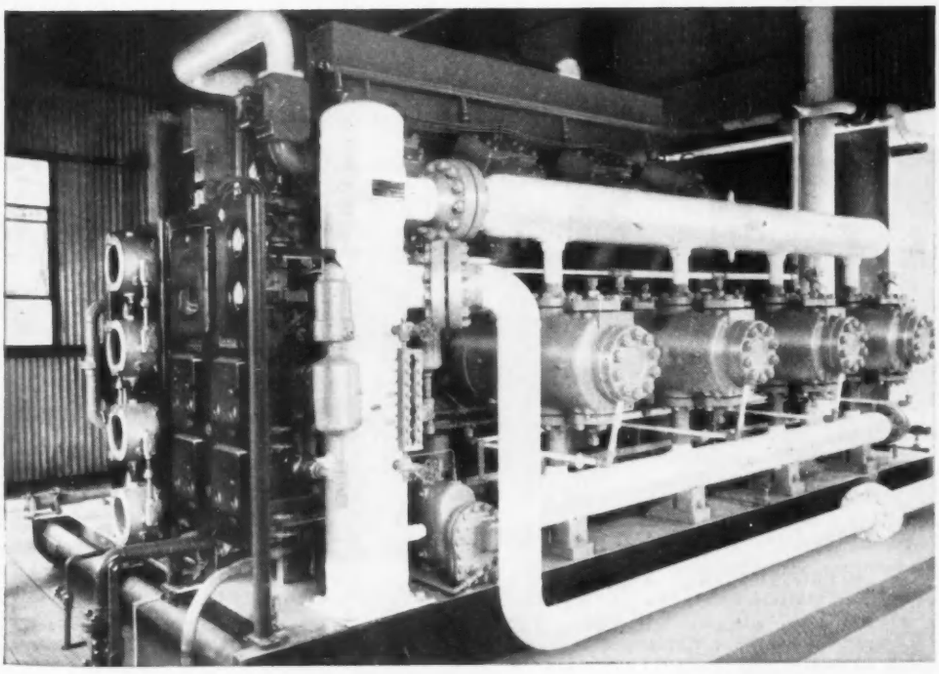
This installation is only a sample of the new things happening in the pipeline field, and this SVG is only a part of the Ingersoll-Rand compressor family that is meeting the challenge of new developments. I-R 4-cycle V-angle engine-compressors are ideal for automated and remote-control installations, due to inherently greater operating *stability* through a wide range of speeds and loads.

Ingersoll-Rand has supplied millions of horsepower of heavy-duty compressors for every possible service, and builds many types of other equipment for the pipeline industry. Call your I-R representative now for more information.



Receiving

Radio signals received by this panel are converted to impulses which start or stop the Ingersoll-Rand SVG gas-engine compressor shown at left below. With the panel, the compressor automatically monitors its operation—it takes its own temperatures, gauges its pressures, watches its lubrication and protects itself from damage. And if any abnormal condition occurs, it warns its operator and shuts itself down.



Ingersoll-Rand

6-894

11 BROADWAY, NEW YORK 4, N.Y.

Only I-R compressors have CHANNEL VALVES

Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of straight-lifting stainless-steel channels and leaf springs, with trapped-air spaces which cushion action, prevent impact.

For more data on advertised products, use Readers' Service Cards, last page.

Jones & Laughlin Supply Division opened a new sales office in Los Angeles. **R. A. Mercer** has been appointed city sales manager for the new office.

R. A. Mercer

John Hopekins

John Hopekins has been appointed plant manager of **Alberta Phoenix Tube & Pipe Limited** it has been announced. He will be responsible for co-ordinating engineering and pipemill operations for the company.

The Youngstown Sheet and Tube Company's board of directors recently elected four new vice presidents. They are: **Robert P. Bremner,** vice president, raw materials; **Donald S. Day,** vice president, traffic; **Dr. Karl L. Fetters,** vice president, research and development and **James D. Sloan,** vice president, purchasing. All four assumed their new posts on January 1.

Bucyrus-Erie Company has announced three appointments in its domestic sales department for commercial cranes and excavators. **Paul J. Thiel** has been named sales supervisor; **Byron A. (Bud) Haney** to product development; **Frederick B. Shew** to sales development manager. All three men are stationed at the home office in South Milwaukee, Wis.

H. B. Marioneaux

Bill Pickering

John L. Morgan

Harry B. Marioneaux was recently elected president and general manager of **The Brewster Company** according to a recent announcement. At the same time, other key executive appointments were also announced. **Bill Pickering** was moved to assistant to the president and sales manager and **John L. Morgan** was named vice president and director of sales.

The appointment of **Charles D. Parks** as field representative at Shreveport, La., for **U. S. Steel's Oil Well Supply Division** has been announced. Parks was employed by Oilwell in 1951 at El Dorado, Ark. He was transferred to Kilgore, Texas, in 1953; to El Dorado in November 1953 and to Shreveport in 1956.

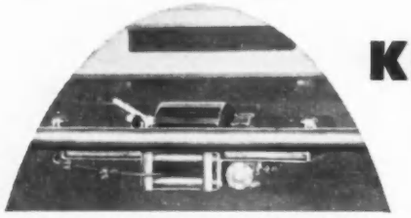
C. C. Call and **B. L. Morris** have been given new assignments with the Hydraulic Sales and Service department of the **Axelson Division, U. S. Industries, Inc.** Call, Hydraulic sales engineer, will transfer from Wichita Falls to Odessa, Texas, and Morris, of the Hydraulic Service staff, transfers to Casper, Wyo., from Odessa. **Lee Manning** has been appointed to the company sales organization as a field representative. Manning will headquarter in Glendive, Mont.

Arthur R. Rattew has joined the staff of the **Airborne Geophysical Division of Canadian Aero Service Ltd.** Previously, Rattew was with Newmont Mining Corporation for several years as a geophysicist.

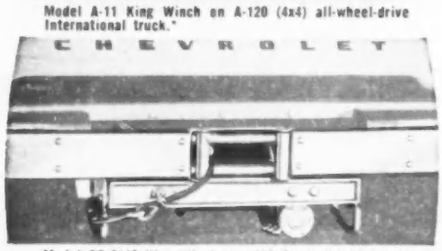
Arthur R. Rattew

Charles B. Caldwell

Charles B. Caldwell has recently joined **Reed Roller Bit Company** sales force as regional representative for the Houston, Gulf Coast area. Caldwell's previous experience includes special sales work with Mid-Continent Supply Company and the presidency of the Harrisburg Sales and Service Company. He has worked in Kansas, Oklahoma and Texas.



Model A-11 King Winch on A-120 (4x4) all-wheel-drive International truck.*



Model CD-8116 King Winch on 1958 Chevrolet Model 31 (4x4).

Model 151J King Winch on Willys Jeep.

KING WINCHES

. . . for Willys, International, Chevrolet, GMC, Ford, Land Rover and other vehicles

COMPLETE, READY-TO-INSTALL KING FRONT-MOUNT WINCH ASSEMBLIES FEATURE:

- winch side arms to reinforce truck frame
- bronze-bushed, 4-way cable guide rollers
- cable drum guard
- heavy-duty pipe bumper
- needle-bearing, universal-joint spline-shaft drive assembly
- Timken bearings on worm

King Winches keep you moving through the most difficult terrain . . . you get action where there's no traction with dependable pulling power. King power winches have pulling capacities of 8,000 to 19,000 lbs.

* *King Winches for International trucks are available through International-Harvester dealers.*

Koenig ALL-STEEL CABS FOR JEEPS

FULL AND HALF CABS

Full Cab and Model 151J King Winch Illustrated.

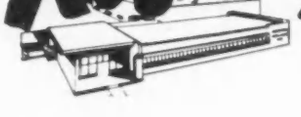
Koenig Jeep cabs and King Winches for Willys vehicles are available through Willys Motors, Inc., and Willys-Overland Export Corp. distributors or dealers. Write for free descriptive literature.

KOENIG ALL-STEEL CABS HAVE THESE SUPERIOR FEATURES:

- PROTECTION
- SAFETY
- COMFORT
- CONVENIENCE

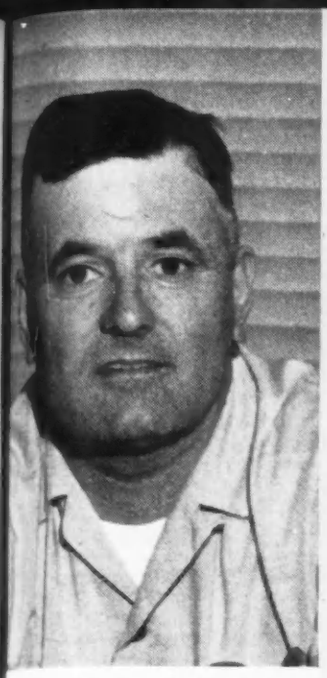
Roll-down windows, full opening . . . full panel-board head lining and masonite door lining . . . safety glass throughout . . . all-steel welded construction . . . door locks.

Koenig

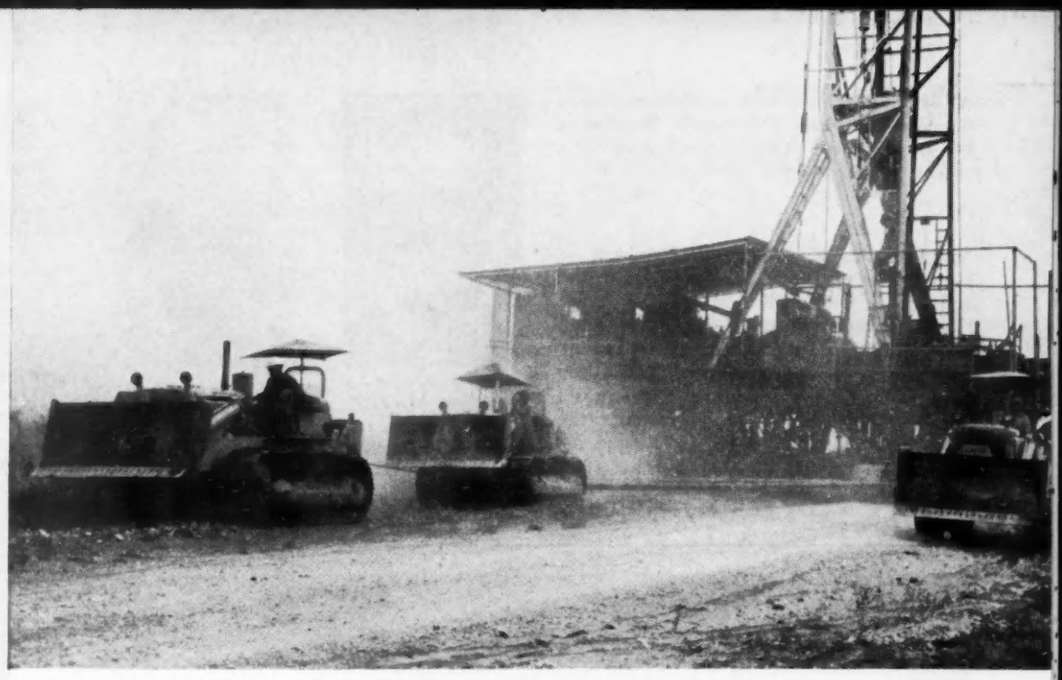


IRON WORKS, Inc.

P. O. BOX 7726 • HOUSTON 7, TEXAS



Troy F. Chaffin, Vice President
Shorty Hall Rig Co. Inc., Odessa, Texas



HERE'S WHY SHORTY HALL RIG CO. INC. IS SOLD ON THE D7

We talked to Mr. Chaffin the day his three Cat D7 Tractors skidded this 600,000 lb. rig. The move of 1½ miles was made in four hours, including placement of skid beams and Athey tracks and site preparation.

Mr. Chaffin gave four reasons why Shorty Hall is sold on the D7 for oil field work:

(1) "The D7s have real lugging power and excellent maneuverability, which is important in skidding, rig building and preparation of drill locations."

(2) "Long life and low-cost operation . . . the Caterpillar oil clutch, for example, has cut repair expenses 90%."

(3) "We can count on very low down time with Cat-built equipment."

(4) "Parts availability is good from our Caterpillar Dealer."

But great as it has been—*now* the D7 is even better! There's a *new* Caterpillar D7 Series D Tractor with increased performance that no other tractor in this power range can match. See below for a quick rundown on it —and see your Caterpillar Dealer for a complete story and a demonstration on your job.

Caterpillar Tractor Co., Peoria, Ill., U. S. A.

NEW ON THE D7 SERIES D

TURBOCHARGED ENGINE with 9% horsepower increase (to 140 HP) . . . 80% more lugging ability.

DRY-TYPE AIR CLEANER eliminates at least 99.8% of all dust from engine intake air during every operating hour. Can be serviced in 5 minutes.

SERVICE-FREE TRACK ROLLERS and idlers are lifetime lubricated. New load carrying design increases roller life.

PRESSURE-LUBRICATED POWER TRAIN insures complete circulation of filtered oil to transmission, bevel gear and pinion. And to transmit increased power, power train components have greater strength.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**NEW D7...
NOW EVEN BETTER
FOR OIL FIELD WORK**

A. M. Suitor has been appointed store manager for **Jones & Laughlin Division** at Drayton Valley, Alberta, according to a recent announcement.

Southern Engine and Pump Company of Houston has assumed the Gulf Coast sales and service representation for the entire **Frank Wheatley** piston and plunger pump lines. Southern will offer exclusive Frank Wheatley sales and service representation from New Orleans, Corpus Christi and San Antonio, Texas. In addition, the Wheatley pump line will be sold from offices in Beaumont, Edinburg, Texas, and Lafayette, La.

William M. Fine

P. L. McManus

Patrick L. McManus has been appointed assistant manager, Marketing division and eastern regional sales manager of the **Worthington Corporation.** He will make his office at the corporation's headquarters in Harrison, N. J. Replacing McManus as manager of the San Francisco district office is **William M. Fine** who for the past five years has been serving as manager of the Minneapolis district office.

Edward A. Murray has been appointed vice president, sales, of **American Steel and Wire,** an affiliate of **U. S. Steel Corporation.** Murray succeeds **Harry M. Francis** who has been elevated to executive vice president of the division.

Dr. A. G. Hill has been named manager of the **Bound Brook plant of American Cyanamid Company.** He has been with Cyanamid since 1932 when he joined the company as a research and development chemist.

A. M. Birnie has been named vice president and manager of sales for **BJ Service, Inc.,** according to an announcement made recently. Effective immediately, Birnie will establish his offices at the Fort Worth headquarters of BJ Service. Birnie is a long-time resident of Dallas, where he will continue to make his home. Since 1951 Birnie has been executive vice president of Security Engineering Co., Dallas drilling tool manufacturer, where he was in charge of all field operations. Previously, he was general sales manager of Welex, Inc., jet perforating firm with headquarters in Fort Worth.

J. Virgil Moore, formerly manager of Engineering and Sales for the **Daniel Orifice Fitting Company,** has been promoted to first vice president of engineering and sales. Moore has been associated with Daniel Orifice Fitting Company for over nine years and will also serve on the board of directors for 1959.

Paul L. Patterson

J. Virgil Moore

Paul L. Patterson has been named special sales representative in the Houston area for the **Frank Wheatley Supply Company** of Tulsa. Patterson comes to Wheatley from eight years with the industrial division of the Goodyear Tire & Rubber Company in Lubbock and Ddessa, Texas, and in Tulsa. Prior to that he was with Thermoid Company in Houston.

Paul R. Gross has been appointed treasurer of **U.S. Steel's United States Steel Supply Division.** Gross succeeds **C. H. Craft** who has been transferred to the corporation's New York offices as executive assistant-treasury department.

Axelson Division of U.S. Industries has announced the transfer of **George G. Browning** to Shreveport, La., **Jack L. Thompson** to Casper, Wyo., and **Hugh D. Wiles** to Hobbs, N. M. All three men will head the sales and service organization in their areas.

A "Pit-O-Graf" MIGHT HAVE SAVED THIS WELL

A Pit-O-Graf can give adequate warning to prevent a blowout. But, it must be where the driller can see it, can take advantage of it. Here's what users have to say:

One oil company says — "Although blowout prevention is a matter of concern for the operator, the contractor, and the drilling crews, generally *the driller is the key man.*"

Another company says—"Since a pit level indicator is so important, take these precautions to get the most good out of it: Place the pit level recording instrument at or near *the driller's position on the derrick floor.*"

If the driller's responsibility is not misplaced, then he can recognize the danger signals that precede every blowout. With the Pit-O-Graf record before him, he can intelligently analyze the *rate* of gain or loss of mud as recorded and thereby direct his crew in the orderly control of the situation at hand. In this case the threatened blowout would become *one that does not happen.*

WARREN AUTOMATIC TOOL CO. HOUSTON W A T C O

WARREN AUTOMATIC TOOL CO.

3915 THARP STREET • HOUSTON, TEXAS

Phone CApitol 4-2511

Lake Charles HEmlock 6-2265 | New Iberia EMerson 9-9862 | Harvey FOrest 6-1441

Well Instrument Developing Company, Bellaire, Texas, has announced the election of **Jean Jouanet** as executive vice president, Jouanet began his oil industry career in 1935 with Schlumberger. He joined Well Instrument Developing Company in Houston in 1955 after eight years of service with A. O. Smith in Milwaukee, Wis.

Jean Jouanet

Hayden Roberts, formerly director of research for Haliburton Oil Well Servicing Co., Duncan, Okla., has accepted a position on the staff of **Business and Industrial Service** of the University of Oklahoma, Extension Division, at Norman.

Carroll J. Green of **Sperry-Sun Well Surveying Company** has been promoted from field salesman to district representative in charge of the Sperry-Sun Lafayette, La., office.

Youngstown Sheet and Tube Company has announced two promotions in the sales department. **Clarence E. Short,** assistant district sales manager in Minneapolis, Minn., became Minneapolis district sales manager. He succeeds **Charles S. Hogan** who has retired. **Albert S. Harris,** member of the oil country tubular sales staff in Youngstown, became assistant manager of that department with offices in Youngstown, Ohio.

Joe P. Pavlich is now district engineer for **Dowell Division of The Dow Chemical Company** at Houston. He was transferred recently from Hobbs, N. M., where he had been a petroleum engineer for the company since 1956.

George B. Hanson has been appointed vice president in charge of sales for **Liquid Mud, Incorporated.** Liquid Mud, under Hanson's supervision, plans an expanded sales and service program with complete barge facilities and engineering services for marsh drilling in the coastal area.

Package Lease Plan Announced By Nationwide Leasing Company

A special Package Lease Plan for the petroleum industry has been announced by Nationwide Leasing Company, Chicago, under which any combination of equipment may be considered one package and leased as a unit for three to five years.

According to Robert Sheridan, Nationwide president, the Package Lease permits large and small firms to acquire $10,000, $25,000, $50,000 or more in equipment without capital investment.

Under the Petroleum Industry Package Lease, a company could lease $10,000 worth of equipment for three years for a monthly payment of $320. The $25,000 Package Lease would cost $800 monthly for three years, $625 monthly for four years. A $50,000 Package Lease features three, four, and five-year terms. Three-year leases would cost $1,600 monthly; four years, $1,250; five years, $1,050.

Schlumberger of Canada Offers Two Scholarships

Schlumberger of Canada has offered two scholarships of $500 each with matching grants of $500 each, one to the University of Manitoba and the other to the University of British Columbia, to be awarded for the scholastic year 1959-1960 and to be known as the Schlumberger of Canada Scholarships.

The scholarship is based on superior academic ability and is tenable in the third or fourth year of electrical, mechanical, or geological engineering or in the fourth of fifth year of honors physics, honors geology, or honors mathematics and physics.

The scholarship was first awarded for the scholastic year 1955-1956. It is a yearly award which is given to the university or universities of Schlumberger's choice for one particular year. During the scholastic year 1958-1959 no award was made.

KA-CY Manufacturing Co., Inc. Is Newly Formed Houston Firm

W. L. Childs and C. B. Kluppel have recently announced their association in the newly formed KA-CY Manufacturing Company, Inc.

The new Houston firm combines the experience of many years in designing, fabricating, machining and sales of pump and compressor units for the petroleum, natural gas, chemical and other industries.

For air or water . . . 3-cone rock bits made of highest Nickel Moly steel in a full size range from 2 15/16" to 7 7/8" for slim hole and shot hole drilling in world-wide formations . . . from soft to hard.

All bits heat treated in our controlled-atmosphere automatic furnaces of latest design to reduce distortion and assure uniformity.

K

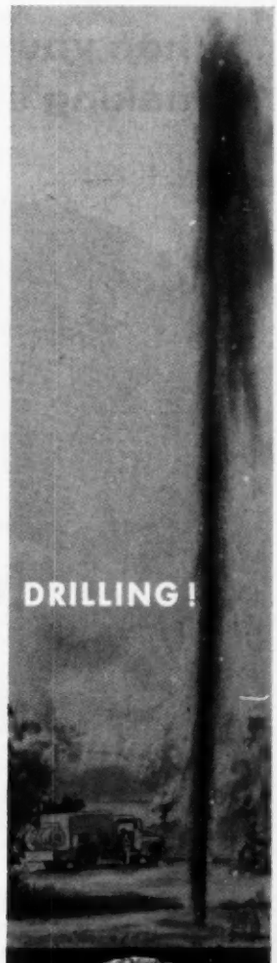
THE LEADERS IN EXPLORATION DRILLING!

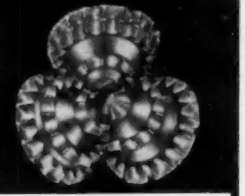
Williams HoleMaker ROCK BITS

Tooth design and spacing selected for greatest speed and efficiency, and tungsten-tipped for long, hard drilling.

Finest quality bearings give freest rolling action. Races machined to exacting tolerances to eliminate thrust loads that tend to slant rollers in races. All balls positioned in races with engineered exactness.

Over 15,000 bits of all sizes (with full or jet-hole water or air courses, as requested) are carried in stock to fill practically all orders immediately. Materials and workmanship of every bit are fully guaranteed.





MANUFACTURED BY

OIL TOOL

MANUFACTURING CO.
P. O. Box 712
Tonkawa, Oklahoma
Telephone: 143

For more data on advertised products, use Readers' Service Cards, last page.

The new Mission Manufacturing installation in the Industrial District near Houston. There are 167,000 square feet under one roof. Aluminum siding serves the dual purpose of being eye pleasing and resistant to corrosion.

Mission Manufacturing Company Opens New 72 Acre Houston Plant

Mission Manufacturing Company has opened its new production plant on a 72-acre site west of Houston.

The new installation combines the most modern automation features and manufacturing versatility. The new plant is particularly noted for its production line techniques which results in the ultimate of metal processing efficiency.

Mission is a producer of oil field fluid end pump parts and is a major manufacturer of numerous types of valves, and produces a variety of drilling tools.

Engineers of Mission toured the United States in preparation for design of the new facility. The best features of some of the finest industrial installations in the country are incorporated in the new plant. Employe safety was one of the prime considerations in design.

In the words of W. B. Sharp, Jr., Mission board chairman, "This new plant is designed to produce oil field and mining tools. But our streamlined production here emphasizes one thing as important as capacity. That is quality."

The present officers of Mission are: W. B. Sharp, chairman; Dudley C. Sharp, Sr., vice chairman; Richard White, president; Charles Bartley, vice president of Engineering and Manufacturing; and Anan Golub, vice president, secretary and treasurer. These officers with Dudley C. Sharp, Jr., W. T. Campbell and Ross P. Bennett, make up the board of directors.

Stanley M. Flynn

Robert D. Clarke

Birdwell, Inc. Purchased by Seismograph Service Corp.

James M. Bird

The purchase of Birdwell, Inc., Bradford, Penn., oil well logging and servicing firm, by Seismograph Service Corporation of Tulsa, world-wide seismic company, was announced recently by G. H. Westby, president of SSC and James M. Bird, president of Birdwell.

Under the terms of the purchase the personnel and facilities of Birdwell, which has 139 employes and 27 field trucks operating out of 11 field stations, will function as a Birdwell division of SSC.

Bird, who founded Birdwell in 1946, has been named vice president of SSC in charge of all well logging activities. He, along with approximately 10 staff members in the engineering, research and development division of Birdwell, will move to Tulsa where they will use the facilities at SSC's offices and plant. Others included in those who will move to Tulsa will be Stanley M. Flynn, vice president in charge of field operations for Birdwell, and R. D. Clarke, assistant to president.

When you're making string

ANVIL Brand threads make it faster!

ANVIL Brand threads are clean, accurately tapered, and electro-galvanized; chamfers and recesses are precision machined. The result is a coupling that makes up fast and firm, without galling.

When you're making string—or pulling it—Anvil Brand Couplings give you the trouble-free service that helps you get lower costs on drilling and production.

Anvil Brand Fittings—A.P.I. Couplings for all oil field uses, as well as bushings, plugs, and nipples, are sold through your nearest supply store. Engineering service is always available from Anvil Brand Representatives in key oil country locations. Write today for information.

PITTSBURGH PIPE AND COUPLING COMPANY
ALLISON PARK, PA., U.S.A.
In the Greater Pittsburgh Industrial District
Subsidiary: Anvil Products, Inc., Longview, Tex.
Affiliate: Canadian Coupling and Fittings, Ltd., Simcoe, Ont.

ANVIL BRAND
forged seamless and wrought steel pipe fittings

LUBE AND MAGCOBAR ENGINEERING CUT DRILLING COSTS

You are always sure of getting every cost-cutting advantage with Magcobar. Here's why: The Magcobar Mud Engineer combines a thorough knowledge of drilling fluid chemistry with experience in your drilling area. This background—plus the top mud lab in the country—gives new dimension to the finest and most complete line of drilling mud products. What does this mean to you? The highest level of product performance to cut your drilling costs.

...to make net savings of $4.87 per foot

Here's proof of actual savings using Bit Lube (E. P. Additive for Mud). The table below shows a drilling cost comparison in the Brownfield, Texas, area. The Bit Lube well was drilled for $4.87 per foot less than the offset well.

	NO. BITS	BIT SIZE	INTERVAL	ROTATING HOURS	WEIGHT ON BIT	RPM
BIT LUBE-WATER	28	7⅞"	4919-7272	185	70-90,000	60-80
WATER	40	7⅞"	4936-7270	379	45-60,000	55-60

Total savings in bits, trips, and drilling time was $13,420. Bit Lube and emulsifiers cost $1,940; a net saving of $11,480!

Bit Lube forms a tough protective film to reduce friction and to increase bit bearing life under extreme pressure conditions. It works best with high weight on the bit and fast rotary speed. Bit Lube and Magcobar engineering may be the answer to your bearing failures.

Bit Lube is only one of Magcobar's many answers to the problem of high drilling cost, a problem that demands the right answers. You'll find that the right products *used right* by Magcobar can cut costs on your next well, too.

Magcobar®
Complete
DRILLING MUD SERVICE

MAGNET COVE BARIUM CORPORATION
HOUSTON, TEXAS

59-200

Magcobar Technology!

BROOK

the motors you can install and forget!

Because they're no ordinary motors—stators, rotors, windings, electrical varnishes, and bearings used are designed and selected to give you long, trouble-free service under the toughest conditions. Yet, BROOK MOTORS cost no more than ordinary motors —*usually cost less!* No wonder BROOK MOTORS are praised so highly throughout industry. NEMA Rerate (Open Drip Proof Shown) and Standard Frame Motors, 1 to 600 horsepower, available from warehouse stocks in principal cities. *Send for the cost-cutting facts today!*

SINCE 1904

world's most respected motor

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250 University Avenue, Toronto, Ontario

BROOK MOTOR CORPORATION

Visit Us at the OIL SHOW

TULSA—MAY 14-23

At the Oil Show we will display our newest design in well servicing units WITH TELESCOPING DERRICK. We cordially invite you to visit us there . . . at Block 208, North Area.

WICHTEX WELL SERVICING UNITS

WICHTEX WELL SERVICING UNITS
2,000′ to 12,000′ capacity
—spudding attachment optional

WICHTEX PORTABLE ROTARY RIGS
2,000′ to 5,000′ capacity

WICHTEX

MACHINERY COMPANY

P. O. Box 2250
Wichita Falls, Texas

European Firm to Manufacture, Sell American Iron Products

Frank X. White

American Iron & Machine Works Company, Oklahoma City, and AMF International Company of Geneva, Switzerland, both subsidiaries of American Machine & Foundry Company, have recently completed licensing arrangements with Usine Metallurgique de Domine Par Naintre (Vienne) of France to manufacture and market American Iron's patented tool joints and drill collars. This announcement was made recently by Frank X. White, AMF divisional vice president and International Group executive.

The French company is an old established manufacturer of a variety of industrial products. The American Iron products will be marketed in France and other French Franc areas throughout the world. It is anticipated that other American Iron products may be licensed to the French company in the future.

Keenan Pipe & Supply Company Named National Tube Distributor

The appointment of Keenan Pipe & Supply Company as a distributor of National Tube oil country tubular products has been announced. The firm has been a distributor for over 20 years of National Tube line pipe, merchant pipe, steel and condenser tubes, alloy and stainless pipe.

The oil industry will be served by Keenan's headquarters in Los Angeles, a branch in Bakersfield and another oil field branch to be announced. In addition, Keenan has other industrial branches in North Hollywood, Pomona, Calif., Phoenix, Ariz., and Las Vegas, Nev.

W-K-M Will Name Authorized Repair Shops for Gate Valves

W-K-M, division of ACF Industries, Incorporated, has announced a new policy of appointing independent concerns as authorized repair shops for the W-K-M through conduit gate valves.

W-K-M authorized repair shops will be required to adhere to the rigid engineering standards set forth by W-K-M, including hydrostatic testing of the repaired valves. Only approved repair parts will be used by these shops and the repair will be performed using the same techniques as at the factory. Any "on the line" repair service where the valve is under pressure will continue to be done by W-K-M's own servicemen.

Alten Opens New, Larger Oklahoma City Warehouse

Alten Foundry & Machine Works, Inc., has opened a new and larger equipment warehouse in Oklahoma City according to an announcement by Warren M. Benson, vice president of Alten. The new facilities will enable Alten to provide larger stocks of Alten pumping units and spare parts, Ideco pumping unit spare parts, and other Alten production equipment for mid-continent customers.

Alten offers a complete line of oil well pumping units from API sizes 6 to 320. W. A. (Lon) Belcher, division manager and W. L. (Bill) Underwood, warehouse manager, will maintain their offices at this location.

GOODALL HOSE

Is better than good...

IT'S THE FINEST ROTARY HOSE MADE

Goodall Rotary Hose is the finest hose made—a strong statement, but one that is proven day after day, year after year.

Because Goodall is *the top quality rotary hose* you receive a one-year warranty with each Goodall hose you buy. A warranty that contains no limits on working pressures. Only the finest hose made—only Goodall with its high burst pressure built into the hose—could make this guarantee. Why not make your next rotary hose Goodall; you get greater value for each dollar spent when you do.

These exclusive features are available *only* with Goodall Long-Life Rotary Hose:

The Barney Coupling

The Goodall Safety Clamp

The Goodall Repair Service

The Goodall One-Year Guarantee

GOODALL RUBBER COMPANY

TRENTON, N. J.

Goodall Rubber Company of Texas: Houston and Odessa

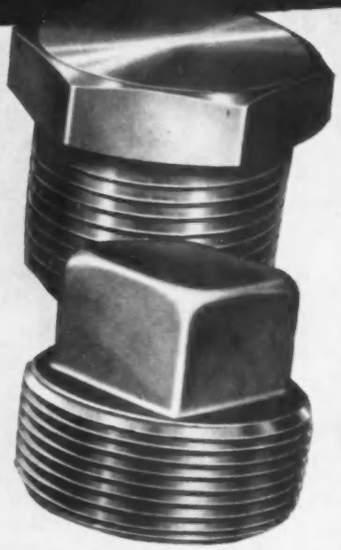
Goodall Rubber Company: New York, Philadelphia, Pittsburgh, Chicago, Denver, St. Paul, Detroit, San Francisco, Los Angeles, Seattle, Salt Lake City, Portland.

Export: Goodall Rubber Company, Trenton, N. J.

Stocking Distributors: Texas and Louisiana — Houston Oil Field Material Co., Wilson Supply Co., Hunt Tool Co., Heap Equipment Company, Iverson Supply Co.

Available through all qualified supply stores.

PLUGS for PRESSURE



FORGED STEEL HIGH PRESSURE PLUGS WITH

Dry Seal

TAPERED THREADS

Both CAPITOL square head and hex head solid plugs have dry seal tapered threads to assure safe, permanent high pressure installations. Individual thread protectors for maximum protection. Conveniently packaged for easier handling.

Square Head Solid Plugs sizes 1" thru 2", all forged steel. Hex Head Plugs sizes ½" thru 2" machined from solid bar.

You'll like these thread protectors, too!

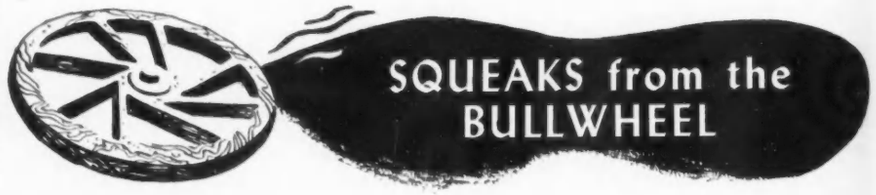
CAPITOL

MANUFACTURING CO.

DIVISION OF HARSCO CORP.

COLUMBUS, OHIO

COUPLINGS — NIPPLES — UNIONS — RADIANT HEAT FITTINGS — FURNACE COILS — WELL SUPPLIES — STEEL PIPE FITTINGS



A Thinking Man's Thoughts

Scene: Washington office of Senator Closeswamp. Sen. CS is giving dictation to his secretary (also wife). All is strictly business; the silence is deadening.

Action: Our announcer, who remains unseen but whose voice is recognized as being out of the land of TV commercials, walks in, peers over Sen. CS's shoulder and inquires in a pleasant voice:

"New bill?"

Sen. CS: (Somewhat surprised and irritated until realizing he is on-camera) *"Yes, to chop down Percentage Depletion."*

Announcer: "You look tired, Senator. I suppose you senators who are experts on the oil industry have to put in long hours."

Sen. CS: *"Oil industry expert? I'm no oil industry expert. My field is chicken plucking—and pickle packing, of course. Has been, all my life."*

Announcer: "Oil and chicken plucking? An unusual combination, wouldn't you say?"

The chicken-plucking, pickle-packing senator tosses his figures to his secretary (also wife), and reaches for a cigarette.

Sen. CS: *"Unusual? Some people might say so, but the oil industry interests me. I read everything about it I can find on the Capital newsstands. I always say that a man ought to do whatever interests him."*

Announcer: "Say, you sound like a man who thinks for himself. Do you often work for the oil industry's welfare? That is, where it affects the nation's welfare?"

Sen. CS: *"Well, no. As a matter of fact, this is my first time out. On a bill that will affect the entire foundation of the industry, that is. Written several other bills, though, on other subjects that I like, mostly Rivers and Harbors."*

Announcer: "By the way, senator, what does the oil industry and those who have devoted a lifetime to its problems think about your plan to chop down Percentage Depletion?"

Sen. CS: *"Oh, lots of individuals—and some groups—have complained. But being from a chicken-pluckin' pickle-packin' state, I know better than to listen. I think for myself."*

Announcer: "Then, you'd say that the industry needs percentage depletion removed or at least chopped to better supply increased demand for oil?"

Sen. CS: *"Well, I think so. Now, you take a lot of senators, they would go and get testimony from a lot of oil industry experts and then make up their minds, but being a thinking man I can get along without that sort of thing."*

Announcer: "Senator, what if you are wrong and the reduction in Percentage Depletion causes higher prices and an eventual shortage of oil? What will the PEOPLE say?"

Sen. CS: *"Well, I've never paid much attention to what other people say. That's the way with us thinking men, you know."*

Announcer: "Would you advise everyone to think for himself?"

Sen. CS: *"Why, of course, on little things. But I'm against their thinking on what us thinking men in the government are up here thinking about."*

Announcer: "Thank you, sir, and I apologize for interrupting your thinking."

Sen. CS: *"Oh, that's OK, son. I wasn't doing anything I shouldn't stop."*

Safety First

A hunter climbed into a tree so nobody would take him for a deer. It worked too—he was shot for a bear.

Human Torch

"Is it true that wild beasts of the jungle won't harm you if you carry a blazing torch?"

"All depends," said the explorer, "on how fast you carry it."

Aches and Pains

After the doctor checked the patient over, the physician asked, "Have you been living a normal life?"

"Yes, doctor."

"Well, you'll have to cut it out for a while."

Fair Trade

"You make the money my father used to make, and I'll cook the way your mother used to cook!"

Riding the Range

A fellow from the Great Open Spaces was giving his girl the Lone Ranger line. "Honey," he said, "I'll love you until the cows come home."

"That's nice," she said, "but in the meantime lay off the calves."

Comforts of Life

Mazie: "Sure I know him; in fact, we've broken bread together."

Daisy: "So what? I know him better than that; we've broken a couple of davenports together."

Just as individuals can be positively identified by their fingerprints, so can the formations of the earth surrounding a well bore. Each formation has definite characteristics or "fingerprints" which identify it beyond doubt – revealing its type, its physical properties and its content.

The trick is to accurately record these "fingerprints" in detail and to provide the instrumentation and experience necessary to reliably evaluate the nature of the formations – that's where McCullough comes in!

McCullough provides the many specialized nuclear logging services listed below. Each employs the highly sensitive Scintillometer. Each is designed to perform a specific function – to identify and to reveal maximum information about those formation characteristics to which it is responsive, with great accuracy.

McCullough Nuclear Logs are clear, detailed, accurate and repeatable. Our many years of experience have developed techniques of interpretation and evaluation that reveal full formation information – with reliable accuracy.

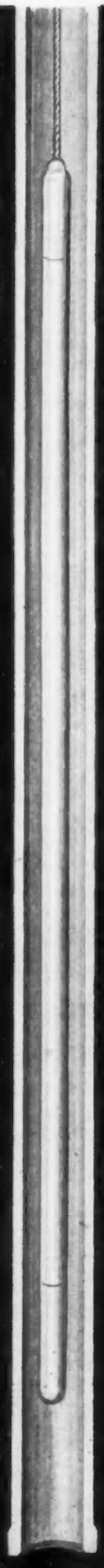
On that next job, it will pay you to let McCullough "fingerprint" your well – and interpret those "fingerprints" to reveal the true nature of sub-surface structures.

McCULLOUGH

McCullough Nuclear Well Logging Services

Gamma Ray Log, Neutron Log or simultaneous Gamma Ray-Neutron Log in cased or open hole.

- Salinity Log and combinations of Salinity-Gamma Ray-Neutron curves in cased or open hole.
- Multiple Spaced Neutron Log in cased or open hole.
- Tracer Service with Sub-surface Injector or surface injection.
- Density Log, simultaneous Density-Gamma Ray Log and combinations of Density-Salinity-Gamma Ray-Neutron curves in open hole.
- Cement Log.
- Simultaneous Collar Log recorded with all Nuclear Logs in cased hole.



ACCURATELY IDENTIFY AND EVALUATE FORMATION "FINGERPRINTS"

NUCLEAR WELL LOGGING *WITH* SCINTILLOMETER®

McCullough *TOOL COMPANY*

LOS ANGELES • HOUSTON • EDMONTON *Cable Address:* MACTOOL

For more data on advertised products, use Readers' Service Cards, last page.

IF YOU USE THESE PRODUCTS . . .

send for the world's most complete, illustrated catalog of

ELECTRIC LANTERNS and SAFETY CANS

VALUABLE DATA:

The world's first comprehensive table of lamp and battery operating information
High power searchlights
All-purpose hand lights
Safety lights and lanterns
Flammable liquid SAFETY CANS
Oily Waste Cans

JUSTRITE Mfg. Co.
2061 N. Southport, Chicago, Ill.

At Show-Booth #17, SCI & TECH Bldg.

INCREASE PRODUCTION

CLEAN OUT CHOKING SAND

Excessive sand and sediment holds back your oil. For fast, easy clean out with fewer round trips and less down-time, use world famous Miller Sand Pumps.

SAND PUMP SIZES
O.D.—2½, 3, 3½, 4¼, 5, 5½, 7 in.
Lengths—20, 25, 30 ft.

Composite Catalog, Page 3400

Write for descriptive price list

MILLER SAND PUMPS

Miller Sand Pump Co.
General Offices, Box 4516
Oklahoma City 9, Okla

EXPORT OFFICES
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.

Out of the Mouths of Babes

An expectant Mother to her young child: "Dear, if you had your choice, which would you prefer, a baby sister or a baby brother?"

Young child: "Gee, Mom, if I do have my choice, and you could manage it, how about making it a pony?"

Blurrr- -vision

Woman (sending TV repairman home). "It's okay now. We had put on each other's glasses by mistake."

Liberal Education

The pretty young teacher was explaining the difference between abstract and concrete.

"Concrete means something you can see," she told the children, "and abstract something you can't. Now who will give me an illustration?"

Little Tommy in the first row was the first to hold up his hand. "My pants are concrete," he said. "Yours are abstract."

Timely Definition

If someone should ask you, and they probably won't, what is a Chloroformed Rabbit? Just tell them it is what is known as an Ether Bunny! OUCH!

Calling Dr. Kildare

The cute little thing entered the Doc's office with a worried look. "Doctor," she said, "I need an operation."

"Major?" asked the doctor.

"No," she said. "Sergeant."

Cost Secondary

A small college with only one dormitory decided to go co-educational. So the dormitory was divided and a line drawn, across which neither sex was to stray.

One boy somehow crossed the line and found himself before the dean, who explained the rules.

"The first time you cross that line it's $5; the second time it's $10. and the third time will be $15. Do you understand?"

"Yes, but I want to know what a season's ticket will cost?"

Hospital Corridors

While waiting outside the operating room, the patient said nothing when two men, clad in white, lifted the sheet and walked on. Shortly, another came along and repeated the procedure.

"When are you going to operate?" the woman demanded.

"Oh," he replied. "I'm just another one of the painters."

Which Way to Where

The young couple was lost on a back road and upon arriving at a house, asked:

"Where will this road lead us?"

"Well," the native replied, "it's led several young couples into trouble."

Diamond Jubilee

A young girl, frequently forced to stand while riding to work, bought a copy of the book, "How to Care for Your First Baby," which she carried to work with immediate success. Seldom did she stand while riding the bus.

In time she got a proposal and accepted a ring. When the diamond came to the notice of the bus driver, he said:

"Got that in plenty of time, didn't you?"

SECONDARY RECOVERY
Since 1922

PETROLEUM ENGINEERS
CABLE & STEPHENS
WICHITA FALLS, TEXAS

RESERVOIR ENGINEERING
Water Flooding Gas Repressuring
EVALUATION CORE ANALYSIS
SURVEYS ECONOMICS
Cost Estimates, Design, Installation
FIELD SUPERVISION
Phone 723-2167

We take pleasure in announcing that

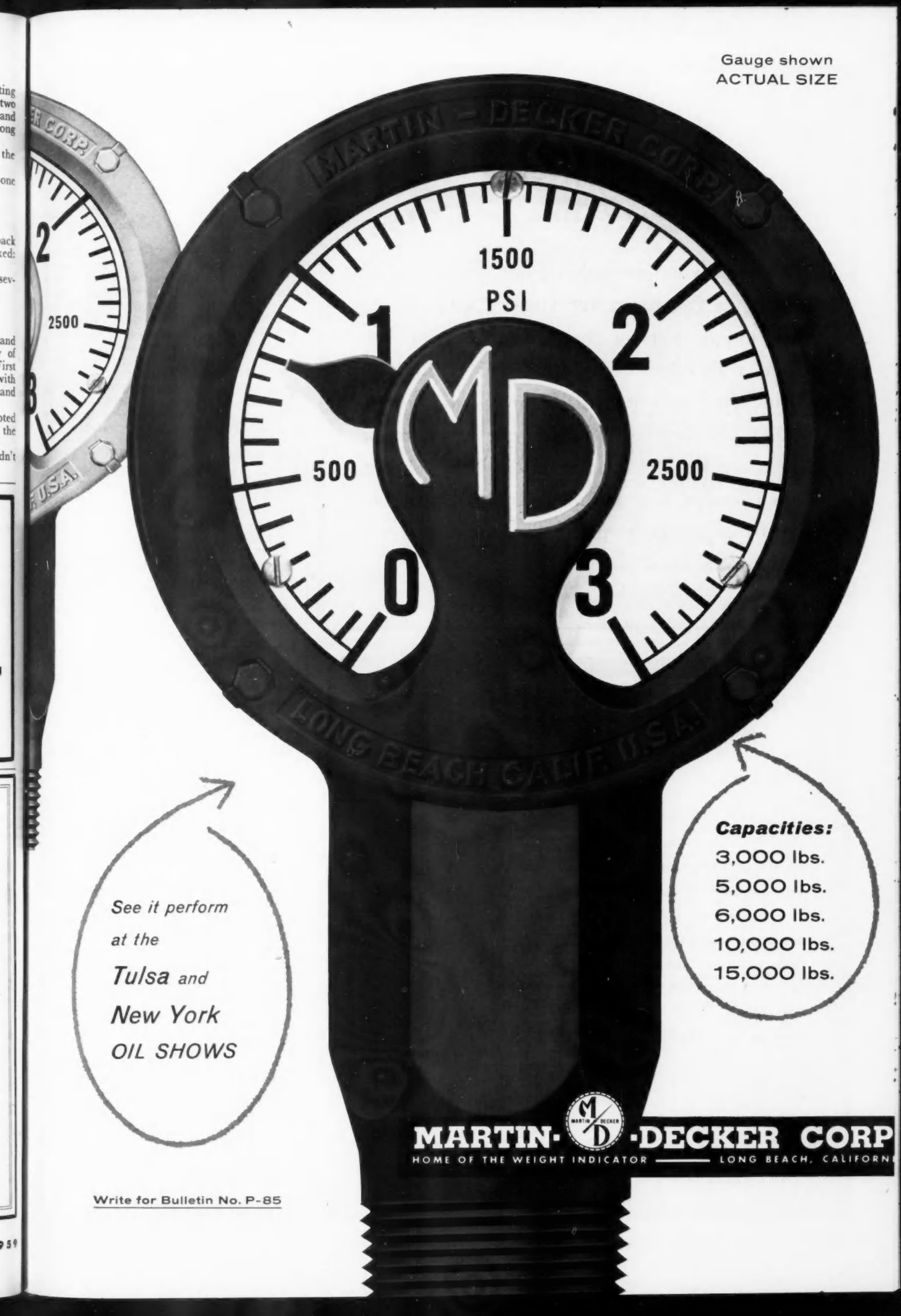
MR. GENE M. WOODFIN

has been admitted to

general partnership in our firm

Carl M. Loeb, Rhoades & Co.

April 1, 1959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ACTUAL SIZE
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PSI
500
2500
0
1
2
3
MD
LONG BEACH CALIF. U.S.A.
See it perform
at the
Tulsa and
New York
OIL SHOWS
Capacities:
3,000 lbs.
5,000 lbs.
6,000 lbs.
10,000 lbs.
15,000 lbs.
MARTIN-DECKER CORP
HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORN
Write for Bulletin No. P-85

National Iranian Oil Company

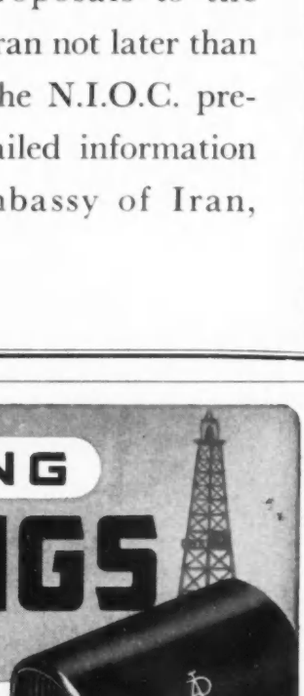
Pre-Announcement No. 228/6, April 1, 1959

With the view to carrying out operations defined in the Petroleum Act, District XVIII of the petroleum districts of Iran shall be declared as "open" with effect from July 1, 1959. Interested parties shall submit written proposals to the N.I.O.C., to be received in Teheran not later than September 1, 1959. Copies of the N.I.O.C. pre-announcement containing detailed information may be obtained from the Embassy of Iran, Washington, D. C.

WHEELING

COUPLINGS

FOR OIL COUNTRY USE



LINE PIPE COUPLINGS A. P. I.
1/8" to 12"—Seamless, Black or Galvanized
PLAIN TUBING COUPLINGS A. P. I.
1" to 4"—Seamless
EXTERNAL UPSET TUBING COUPLINGS A. P. I.
3/4" to 3 1/2"—Seamless
CASING COUPLINGS A. P. I.
4 1/2" to 13 3/8"—Long or Short
HYDRAULIC COUPLINGS
1/8" to 4"—Seamless
REAMED AND DRIFTED A. I. S. I.
3/4" to 12"—Seamless
DRIVE PIPE COUPLINGS
6" to 12"—Seamless
PIPE NIPPLES
All Sizes and Types
STEEL BUSHINGS AND PLUGS
Merchant and High Pressure

WHEELING MACHINE PRODUCTS COMPANY

WHEELING, WEST VIRGINIA

WEST COAST FACTORY: WOODLAKE, CALIFORNIA

Hot-Shot Salesman

"Just tell me one good reason why you can't buy a new car now," said the persistent automobile salesman.

"Well, I'll tell you. I'm still paying installments on the car I swapped for the car I traded in as part payment on the car I'm two payments behind on now."

Friends Till the End

Joe sat beside his dying partner, keeping the deathbed watch. Suddenly the dying man began to speak.

"Joe," he wheezed, "I have a confession to make to you. I robbed the company of $10,000. And that's not all Joe. I sold a secret formula to the competitors, and I stole the letter from your desk that got your wife her divorce, and Joe . . . . .

"That's okay, old man," Joe murmured, "I'm the one who poisoned you."

Fastest Man Alive

An athlete has covered a mile and 10 yards in less than a minute! The first 10 yards was right up to the edge of the Grand Canyon. The next mile was straight down.

It's Lather Good

This new soap on the market can't make the dishes sparkle. It won't take ink stains out of your shirt. The bar won't lather even if you put it in hot water and stir it with a spoon, but believe me, it sure is good to eat, and it keeps your stomach clean.

Whose 'Dennis the Menace?'

The "seventy-six trombones that led the big parade" were all loused up by one little kid on the sidewalk who was sucking on a lemon.

It's Shocking

Newton's tenth law: The dimmer the porch light, the greater the scandal power.

Honesty, The Best Policy

Husband: "Frankly speaking, do you love me for my money?"

Wife: "Well, if we are speaking frankly, what else is there about you to love?"

Lonely Hearts Club

Want ad from a Tokyo newspaper, as reported by United Press International: "Smoking, drinking, carousing, Japanese-speaking Caucasian gentleman wishes to meet smoking drinking, carousing, Japanese-speaking lady.

"Object: Smoking, drinking, carousing. Send photo."

One for the Road

The gentleman sat down at the bar and ordered a martini. "Very dry," he insisted. "Twenty parts gin to one part vermouth."

"Shall I twist a bit of lemon peel over it?" asked the bartender.

"When I want lemonade, my good man, I'll ask for it!"

Share and Share Alike

"Jim, Jim, whispered the woman hoarsely, as she shook her sleeping husband, "there's a burglar in the dressing room going through your pants pockets!"

"Oh for heaven's sake," grumbled the man, turning over sleepily, "why don't you two just fight it out between yourselves?"

Laboring Laws

Be sure that you work eight hours a day, and sleep eight hours a day, but NOT the SAME eight hours.

H. U. Garrett

Clarke A. Polk

H. U. Garrett Purchases McFarland Manufacturing Corp.

H. U. Garrett of Longview, Texas, acquired the assets of McFarland Manufacturing Corporation of Houston.

The firm was founded in 1948 and manufacturers air, gas and fluid-operated chemical injectors, transfer pumps, proportioners and hydrostatic testing units which are distributed to the oil, refining, processing and petro-chemical industries.

Effective with the date of purchase, the corporate name was changed to McFarland Manufacturing Company, with Garret as president. Clarke A. Polk continues as vice-president and Lyal W. Hetrick as secretary-treasurer.

Mid-Continent Supply Co. Named Distributor for Enardo Mfg. Co.

Mid-Continent Supply Co. has been named to distribute the oil field products of the Enardo Manufacturing Co., of Tulsa.

By the agreement, Mid-Continent will sell Enardo products in the United States and Canada. Mid-Continent stores have been stocked with the complete Enardo line.

Good Used Drilling, Well Servicing and Cable Tool Rigs and Equipment

Financing or lease purchase plans available on the following:

ROTARY DRAW WORKS: Cardwell RL, KL, S, HL and L; also Wilson Atlas, Super and Mogul.
CABLE TOOL HOISTS: Cardwell RL, KL and 3-Drum RL.
SERVICING HOISTS: Cardwell K200, HS & L; also two Wilsons.
CABLE TOOL RIGS: Variety available, including Bucyrus-Erie and Cardwell KL.
ROTARY RIGS: Variety available, including Cardwell, Oilwell and Wilson.
COMPLETE SERVICING RIGS
Cardwell AL w/Model 75 Mast
Cardwell AL w/Model 75 Mast
Franks 658 DTM, Truck-Powered
(This unit leased)

PHONE WICHITA—AMherst 7-3311
or contact the local representative for

Cardwell Manufacturing Company
Box 2001, Wichita, Kansas

WORLD OIL'S Trading Post CLASSIFIED ADVERTISING

RATES: Regular Classified (undisplayed) **set in this size type: 20 cents per word. Minimum charge $4. Blind box address in our care counts six words. Replies forwarded without charge. Display Classified ads, set in suitably larger type with ruled border, $13.50 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. All classified ads payable in advance.** Send copy and checks to: Trading Post Classified Section, World Oil, P. O. Box 2608, Houston, Texas.

BUSINESS SERVICE

■ DESIRE direct contact with Purchaser interested in acquiring Oklahoma Producing Leases with 29 wells—490 bbls. daily production. Address Box 190-W, WORLD OIL, Houston, Texas.

■ Financial Contacts, Underwriters, Brokers, Private Finders of Capital reached. No shopping. Confidential. FREE ENTERPRISE ASSOCIATES, 817 - 51st St., Brooklyn, N. Y.

VENEZUELAN CONTACT

Do you need Venezuelan Contacts, Representations, Surveys or "local know-how," if so write

TEN EYCK HULL
Edificio Galipan **Caracas, Venezuela**
Cable: CALLHULL **Telephone: 33-31-95**

"Flowers for Thought"

SOUTHWEST FLORIST
Bank of The Southwest Bldg.
Houston, Texas
CA 5-6603
Cable Address:
SOUFLO, Houston, Texas

FOR LEASE

■ FOR LEASE—on Long Drive in Houston: Two connecting steel shop buildings each 40' by 100' totaling 8000 square feet. Craneway each building one with 20 foot lift, 35 foot span, other 14 foot lift, 20 foot span. Also outside craneway. Three-quarter acre yard. Connecting air-conditioned office with 1070 square feet. Particularly well located for serving oil industry and industrial markets of this area. Contact owner: Willard R. Davis, 1020 Campbell Road, Houston 24, Texas, Phone HOmestead 5-3884.

SITUATIONS WANTED

■ GEOLOGIST—15 years—Rocky Mountains, Gulf Coast, Mid-Continent. 2 years Graduate Geology, 2 years Law. Diversified experience: Geological, Land, Drilling, Completions, Management. Desire affiliation aggressive Independent. Box 192-W, WORLD OIL, Houston, Texas.

MATERIALS SUPERVISOR—Age 35, Married. Experience in Organizing, Managing, Administration and Procurement of Materials for Drilling, Production and Exploration operations. Experienced in Coordination of materials. Twelve years Domestic & Foreign experience. Presently Employed. Desire Top level position with progressive, expanding organization. References & Complete Resume available. Box 191-W, WORLD OIL, Houston, Texas.

FOR SALE

■ Oil Leases in Kentucky For Sale—⅛ interest in 800 acres located in 3 counties. $30 per acre. Box 193-W, WORLD OIL, Houston, Texas.

■ Well established Oil Field Supply store in center deep and shallow production. Supplies bought direct from manufacturers. Only store in growing West Texas town. Box 194-W, WORLD OIL, Houston, Texas.

Lacy AP-160 PUMPING UNIT
New Gear Box—Price—$4500.00
Lacy OD-58 PUMPING UNIT
Price—$2800.00

POWERINE OIL CO.
12354 Lakeland Rd. — Ph. RAymond 3-3357
Santa Fe Springs, Calif.

FOR SALE PORTABLE DERRICK

1 Oilwell Portable Derrick Model 133 B with 10' x 46' 6½" x 26' 5½ width Sub-Structure with steel plate on bottom. Cap/ 500,000#. Height 133', assembled with taper dowels, derrick legs pivot into place from ground level. Excellent condition. Located in Corpus Christi, Texas, area. Price $15,000.00. Wm. H. Martin, 317 Santa Monica, Corpus Christi, Texas. Telephone Ulysses 2-6513.

HELP WANTED

TENNESSEE GAS TRANSMISSION COMPANY
has career opportunities for
PETROLEUM PRODUCTION ENGINEERS

for its expanding oil and gas production operations. Must have B.S. or M.S. in Petroleum or Geological Engineering and 4 to 8 years experience in both Reservoir and Production Engineering. Age to 35. Send complete personal history including education and description of experience to:

EARL R. PARKER, Senior Placement Counselor
TENNESSEE GAS TRANSMISSION COMPANY
P. O. Box 2511 • Houston, Texas
(All replies will be held in confidence)

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